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Short Sea Shipping Market Study

Prepared for
Transportation Development Centre
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by

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September 2005

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16. Abstract

This study analysed the potential for a short sea shipping service between the ports of Halifax and Hamilton from a marketing, technical, economic and policy perspective. The results of the study indicate there is sufficient domestic and international cargo that could be attracted to such a service, but under present circumstances, it is not financially feasible for a number of reasons, most notably the cost of vessels. In addition, the issue of winter service in the St. Lawrence Seaway poses significant challenges in terms of adhering to modern supply chain requirements. Several areas are suggested where costs can be reduced and several alternative services are recommended for further investigation.

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16. Résumé

L'étude a examiné la faisabilité commerciale, technique, économique et stratégique d'un service de transport maritime à courte distance entre les ports d'Halifax et d'Hamilton. Les résultats de l'étude indiquent qu'il existe un trafic de marchandises, intérieur et international, suffisant pour justifier un tel service, mais que, dans la conjoncture actuelle, celui-ci ne serait pas rentable financièrement pour plusieurs raisons, dont la première est le coût des navires. De plus, la navigation hivernale sur la Voie maritime du Saint-Laurent pose des restrictions difficilement conciliables avec les impératifs de la chaîne d'approvisionnement moderne. Plusieurs moyens de réduire les coûts sont évoqués, et des solutions de rechange sont recommandées en vue d'un examen plus fouillé.

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Executive Summary

Container shipping was prevalent on the St. Lawrence Seaway in the 1960s and 70s, but as vessels got larger and intermodal rail service became more efficient, container gateways at Halifax, Montreal, New York and elsewhere usurped the role that Great Lakes ports played in the shipment of general cargo. The economies of scale that ever larger container ships offered (and continue to offer) made it difficult for Great Lakes container shipping to compete.

Since the early 1990s, for reasons relating to road congestion and a desire to reduce greenhouse gas emissions, the European Commission has undertaken to encourage a modal shift from road to sea. Two programs, PACT (Pilot Action for Combined Transport) and Marco Polo, have provided monetary support for numerous studies, research and development, promotion centres and start-up funding for actual short sea services. Most European short sea services are a result of geography and market conditions, and those that compete with highways (motorways of the sea) have struggled to get established, although progress has been made, particularly in the Mediterranean region.

Recent initiatives by both the US Maritime Administration and Transport Canada have resulted in several conferences and workshops, as well as studies directed toward establishing short sea services. In many respects, the motivation is similar to Europe's: to relieve highway and border congestion, and to reduce greenhouse gas emissions. However, for many reasons, new short sea services in both countries have been slow to materialize.

The present study was initially predicated on international container cargo moving between the Port of Halifax and southwestern Ontario. Both the Port of Hamilton and the St. Lawrence Seaway Management Corporation are very interested in attracting short sea shipping, in particular container shipping, to use their facilities. The Port of Halifax has a base of cargo and shipping lines that already use various short sea feeders operating to Newfoundland, St. Pierre et Miquelon and New England. Most of its Ontario origin/destination cargo, however, currently moves by rail.

Even though there is considerable interest from a marketing perspective, with existing rail rates prevailing between Halifax and Toronto, a short sea service based purely on international cargo is not financially viable, since the largest customers of CN also pay the lowest rates to the railway. By adding a domestic component at domestic intermodal rates (which may be more desirable from a public policy standpoint), it is financially more attractive, but ironically, *domestic* shippers (including retailers and truckers) are mostly interested in moving their *international* imports this way, since short sea shipping does not offer them enough frequency for domestic shipments.

A major hurdle to overcome is that of providing uninterrupted service in winter. The alternatives we examined, such as trucking the cargo from Montreal or sending the ship to Albany, New York, are too expensive to be absorbed by an already financially squeezed proposition. In our view, however, the proposed service is too marginal from a financial perspective to justify even considering opening the Seaway year round. With a 12 month operation, most scenarios we considered are still not viable.

Besides the aspect of winter service, the other supply chain issue is the requirement to provide at least weekly service. To achieve this between Halifax and Hamilton would require two vessels. Based on our own operating experience, it is best to build a feeder service around a particular mother ship or mainline service. There are currently several in Halifax to choose from. The schedule would depend on which shipping line or alliance (e.g., the Grand Alliance) committed the most cargo. Ideally, the feeder would also load and discharge in straight time to avoid paying overtime rates. Because this particular feeder service would not open up new markets for either the Port of Halifax or the terminal operators (such as New England in the past), it is unlikely that they would reduce their handling rates.

In terms of policy and regulatory matters, there are several issues that can be addressed, and that will have an impact on the financial viability of domestic short sea shipping in Canada:

1) The 25% duty required to be paid on foreign-built ships;
2) The inability to obtain pilotage exemption for Canadian-flag vessels in the St. Lawrence River; and
3) The potential to obtain reductions in both Seaway tolls and marine service fees.

The most serious impediment toward investment in short sea shipping, however, is the 25% duty, which constitutes a serious barrier to entry, particularly in the start-up phase when cargo is building and before it finds its "natural" level. Canadian-flag ships are not "traded" like ships are in other jurisdictions, and thus there is comparatively little investment in the sector compared to, say, Norway, Sweden and Germany.

All of which is not to suggest that Transport Canada give up on developing short sea shipping. In our view, rather than focus on the subject of the present service (Halifax-Hamilton), policy makers and short sea shipping entrepreneurs should concentrate on the following opportunities:

- Routes where short sea shipping can help to overcome traffic or border congestion: i.e., Highways 401/40;
- Routes where there is no rail alternative: i.e., Quebec north shore to Montreal / Great Lakes or Halifax;
- Routes across the Great Lakes that are not subject to either Canadian coasting trade legislation or US Jones Act restrictions, which could alleviate severe congestion and which would not be restricted by Seaway closure;
- Intercoastal short sea opportunities between Atlantic Canada and US east coast and Bermuda / Bahamas (this is the subject of another ongoing study by Dalhousie University).

Sommaire

Le transport par conteneurs était courant sur la Voie maritime du Saint-Laurent dans les décennies 1960 et 1970, mais à mesure que les navires grossissaient et que le service ferroviaire intermodal gagnait en efficacité, les centres de transit de conteneurs d'Halifax, de Montréal et de New York, entre autres, ont usurpé le rôle que jouaient les ports des Grands Lacs dans l'acheminement des marchandises générales. Face aux économies d'échelle qu'offraient (et qu'offrent encore) les porte-conteneurs toujours plus gros, le transport de conteneurs (par laquiers) jusqu'aux ports des Grands Lacs devenait de moins en moins concurrentiel.

Depuis le début des années 1990, pour tenter de réduire les encombrements routiers et les émissions de gaz à effet de serre, la Commission européenne a résolu d'encourager un virage modal, du transport routier au transport maritime. Deux programmes, PACT (*Pilot Action for Combined Transport*) et Marco Polo, ont contribué financièrement à plusieurs études, à des projets de recherche et développement et à des centres de promotion du transport intermodal, et ont financé le démarrage d'un service de transport maritime à courte distance. En Europe, la plupart des services de transport maritime à courte distance sont le résultat de la géographie et de conditions du marché, et ceux qui font concurrence à la route (les *autoroutes de la mer*) n'ont pas été établis sans peine. Des progrès ont toutefois été accomplis, notamment en Méditerranée.

Des initiatives récentes de la US Maritime Administration et de Transports Canada ont mené à plusieurs conférences et ateliers, de même qu'à des études visant l'instauration de services de transport maritime à courte distance. À plusieurs égards, la motivation est la même de ce côté-ci de l'Atlantique qu'en Europe : réduire la saturation des réseaux routiers et les encombrements aux postes frontaliers, et diminuer les émissions de gaz à effet de serre. Toutefois, pour une foule de raisons, les nouveaux services maritimes à courte distance ont été lents à se matérialiser, tant au Canada qu'aux États-Unis.

La présente étude devait porter à l'origine sur le transport international de marchandises par conteneurs entre le port d'Halifax et le sud-ouest de l'Ontario. Tant le Port d'Hamilton que la Corporation de gestion de la Voie maritime du Saint-Laurent souhaitent amener les compagnies de transport maritime à courte distance, en particulier les services de transport par conteneurs, à utiliser leurs installations. Au port d'Halifax, certaines compagnies maritimes ont déjà recours à des services de collecte/distribution de conteneurs (*feeders*) pour acheminer leurs marchandises à Terre-Neuve, aux îles Saint-Pierre et Miquelon et en Nouvelle-Angleterre. Mais la plupart des cargaisons en provenance et à destination de l'Ontario sont présentement acheminées par train.

Malgré tout l'intérêt *marketing* que suscite le transport maritime à courte distance, les tarifs actuels de transport ferroviaire entre Halifax et Toronto sont tellement avantageux qu'un service axé uniquement sur le trafic international ne serait pas viable financièrement, car les plus gros clients du CN paient déjà les tarifs les plus bas pour le transport ferroviaire. Avec l'ajout d'un volet intérieur, assorti des tarifs intermodaux intérieurs (ce qui pourrait être plus souhaitable du point de vue de l'intérêt public), le service serait plus attirant financièrement, mais ironiquement, ce sont surtout leurs importations, soit les cargaisons *internationales*, que les expéditeurs *canadiens* (y compris les détaillants et les camionneurs) sont intéressés à confier à un service

de transport à courte distance, car ce service n'est pas assez fréquent pour leurs expéditions intérieures.

Un des défis majeurs à relever est d'offrir un service ininterrompu en hiver. Les solutions examinées, comme le transport par camion à partir de Montréal ou l'envoi du navire à Albany, New York, sont trop onéreuses pour être incluses dans une proposition financière déjà serrée. À notre avis, cependant, le service proposé est trop marginal, financièrement parlant, pour justifier que l'on envisage même de garder la Voie maritime ouverte à longueur d'année. En effet, même en supposant des activités étalées sur douze mois, la plupart des scénarios étudiés ne sont pas plus viables.

Outre l'aspect du service hivernal, la chaîne d'approvisionnement comporte une autre exigence, soit un service au moins hebdomadaire. Or, pour assurer un service hebdomadaire entre Halifax et Hamilton, il faudrait deux navires. D'après notre expérience, le mieux est de créer un service de collecte/distribution autour d'un navire-mère ou d'un service de ligne principale particulier. Il en existe actuellement plusieurs à Halifax parmi lesquels choisir. L'horaire dépendrait de la compagnie ou de l'alliance maritime (p. ex., Grand Alliance) qui engagerait le plus de fret. Idéalement, le service de collecte/distribution assurerait aussi le chargement et le déchargement pendant les heures de travail normales, ce qui éviterait le paiement d'heures supplémentaires. Comme ce service particulier de collecte/distribution n'ouvrirait pas de nouveaux marchés ni pour le port d'Halifax ni pour les exploitants de terminaux maritimes (comme la Nouvelle-Angleterre dans le passé), il est peu probable qu'ils réduisent leurs tarifs de manutention.

Sur le plan des politiques et de la réglementation, il y a plusieurs facteurs à examiner, qui auront des répercussions sur la viabilité financière du transport maritime intérieur à courte distance au Canada :

1) les droits de 25 p. 100 exigibles sur les navires construits à l'étranger;
2) l'impossibilité pour les navires battant pavillon canadien d'être exemptés du pilotage obligatoire dans la Voie maritime du Saint-Laurent;
3) la possibilité d'obtenir des réductions des péages dans la Voie maritime et des droits de services maritimes.

Le principal obstacle aux investissements dans le transport maritime à courte distance est la taxe de 25 p. 100, qui constitue une barrière non négligeable, surtout au moment du démarrage, alors que le transporteur est à bâtir sa clientèle et qu'il n'a pas encore atteint son «rythme de croisière». Les navires immatriculés au Canada ne sont pas «achetés/vendus» de la même façon que le sont les navires dans les autres pays; il s'ensuit que les investissements dans le secteur sont faibles comparativement à ceux observés, p. ex., en Norvège, en Suède et en Allemagne.

Tout ce qui précède n'a pas pour but d'inciter Transports Canada à renoncer à ses projets de transport maritime à courte distance. Mais à notre avis, plutôt que de se concentrer sur la liaison Halifax-Hamilton, les décideurs et les entrepreneurs en transport devraient explorer les possibilités suivantes :

- liaisons dont la mise en place contribuerait à réduire les congestions routières et les engorgements aux postes frontaliers : p. ex., routes 401/40;

- liaisons qui combleraient l'absence d'un service ferroviaire : p. ex., liaison entre la côte nord du Québec et Montréal / les Grands Lacs ou Halifax;
- liaisons dans les Grands Lacs non assujetties à une législation canadienne sur le cabotage ou aux restrictions de la *US Jones Act*, qui pourraient réduire les fortes congestions et qui ne seraient pas touchées par la fermeture de la Voie maritime;
- service de cabotage international entre le Canada atlantique et la côte est des États-Unis et les Bermudes / Bahamas (cette question est le sujet d'une étude en cours à l'Université Dalhousie).

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1. INTRODUCTION

As a transportation technology, containerization is now almost 50 years old, having been "invented" by Malcolm Maclean, a US trucker, in 1956. However, the concept did not really take hold until the mid-1960s, when ports on both sides of the Atlantic began to make the necessary investments in terminals and cargo-handling equipment to accommodate a new type of ship built to carry containers.

The first ISO standard containers in Canada were handled in 1967 in the Great Lakes ports of Toronto and Hamilton. Federal Commerce and Navigation (now Fednav), which carried bulk grain and steel on the Lakes, began carrying containers as deck cargo during the open navigation season. In 1969, Hamburg American and North German Lloyd put three partly converted semi-cellular vessels into service from Europe to Montreal-Toronto-Hamilton and a number of US ports. Another company, Poseidon Lines, ordered two semi-container ships of 250 TEUs (twenty-foot equivalent units) to start service in late 1970, in conjunction with the new German carrier Hapag Lloyd, which had two smaller vessels of only 145 TEUs. In the meantime, Zim Line, an Israeli-flag carrier began carrying containers on conventional vessels between the Mediterranean and Montreal and Toronto.

Container shipping on the Seaway was short-lived, however. As early as 1970, a number of lines, including Manchester Liners and Canadian Pacific, withdrew from the Lakes in favour of stopping in Montreal or Quebec City and shipping containers inland by "fast, low cost container rail service".[1] The economies of scale of even the first generation of container ships made it difficult for the Seaway to compete.

In terms of container terminal development, two ports led the way: Montreal and Halifax. Montreal saw the first transatlantic container service, with Manchester Liners operating from Manchester, England, to Montreal using three 500 TEU vessels in November 1968. With a speed of 21 kn, Manchester Liners was able to provide six day service between Manchester and Montreal. Loading and unloading time was reduced to about 20% of that required for a conventional vessel. In a previous incarnation as Furness Withy, the company had provided break bulk services into the Lakes and thus had a clientele and agency network already established. The size of its vessels was predicated on the Manchester Ship Canal and ice-breaking was promised on the St. Lawrence for the 1968 navigation season, so the company was confident of being able to provide year-round service to Montreal. Service into the Lakes would have required additional vessels and terminal infrastructure, and year-round service would have been impossible, but at some point in the 1970s, Manchester Liners began a feeder service from Montreal into the Lakes.[2]

In some respects, containerization was Halifax's response to the opening of the Seaway in 1959. After the Second World War, Halifax was relegated to the role of one of Montreal's winter ports (the other being Saint John), and the future looked very dim. Containerization allowed Halifax to capitalize on its natural advantages (deep water, just 15 miles off the Great Circle Route, and ice free) and, through good intermodal connections, penetrate a much larger hinterland than had been possible previously.

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[1] Peter Hunter, *The Magic Box: A History of Containerization* (Toronto: ICHCA Canada, 1993), p. 46.
[2] Hunter, p. 188.

The pace of development quickly picked up after Halifax's container terminal, Halterm, was opened in 1970. New lines such as Dart Containerline, Atlantic Container Line, Hapag Lloyd, Columbus Line and Zim Container Service inaugurated service with either fully cellular or roll on, roll off vessels (in the case of ACL). This first generation of vessels was about 1,500 TEUs, compared with Manchester Liners' ships of 450 TEUs.

Since the 1980s, container shipping on the Great Lakes has been sporadic. In the 1980s, Falline, a division of Fednav, carried containers from the Far East and Europe as far as Chicago in the open navigation season. In the winter months, the vessels called at Baltimore and containers were shipped to Chicago by rail. The Manchester Liners feeder service ceased operations in 1981. At other times, shipping lines such as Balt Canada Line or Canadian Christiansen Africa Line, would send their container or semi-container vessels into the Lakes because they wanted to avoid paying for rail haulage from either Halifax or Montreal. In 1989, there were eight carriers that still advertised container services into the Lakes.[3]

By 1990, however, less than 30,000 tonnes of containerized cargo passed through the Montreal-Lake Ontario section, compared with about 5.5 million tonnes at Montreal, 3.9 million in Halifax and 12.5 million in New York. A 1994 study by Robert J. McCalla suggests three reasons for this: physical limitations of the Seaway, economic limitations, and institutional issues.[4] The maximum draft of the Seaway was 7.7 m, but a 1,000 TEU vessel drew about 9.5 m and 1,500 TEU ships, which were basically obsolete by 1990, needed 11 or 12 m. Smaller vessels were still prevalent in some of the trades that had not yet been "containerized", such as Africa, South America and the Caribbean. Seaway transits are also time-consuming for vessels, and shipping lines achieve better productivity and asset utilization by turning their vessels at Montreal. In 1980, the Seaway reduced container rates to the same as bulk cargo to encourage container shipping, but with no evident effect. McCalla concluded that the Seaway's physical limitations were of greater importance than extending the season or reducing the rate, and that sheer economies of scale made it difficult for 1,000 TEU vessels in the Seaway to compete with 2,800 TEU ships to Montreal and 4,000 TEU vessels calling at Halifax and New York.

Perhaps short sea shipping portends a brighter future for containerized shipping on the Seaway. Since the early 1990s, the European Commission (EC) has been promoting short sea shipping as an alternative to road transport, and to some degree has been successful in this regard. As of 2004, it claims that more than 40% of all potential cargo now moves by water. In the past two to three years, both the US Maritime Administration (MARAD) and Transport Canada (TC) have been promoting the potential of short sea shipping to alleviate congestion on highways that border coastlines, such as I-95, I-5 and I-10 in the US and Highway 401/20 and 40 in Canada.

This study examines the potential to shift cargo currently moving by rail or road between the deep-sea port of Halifax and the inland market and Great Lakes port of Hamilton, Ontario. It focuses on both overseas transhipment cargo as well as domestic intermodal cargo.

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[3] Armada Lines, CCAL, Torm Lines, Fednav, Yugoslav Line, Lykes Line, Netumar and Saguenay Shipping.

[4] Rober J. McCalla, *Water Transportation in Canada* (Halifax: Formac Publishing, 1994), p. 172.

During the past five years, the Port of Halifax has averaged 487,000 TEUs of container cargo, reaching a peak of 548,000 TEUs in 2000. The Port of Hamilton is primarily a bulk port, but has been actively pursuing a number of short sea shipping opportunities and is very interested in the potential for container shipping in the Lakes. Halifax has a long history of transhipment and feeder-type services. Currently, it has this type of service operating to St. John's and Corner Brook, as well as Saint-Pierre et Miquelon, and both Portland and Boston. The services to Newfoundland and Saint-Pierre carry a mix of overseas and domestic cargo, whereas the service to New England is a pure container feeder transhipment service.

This report is organized as follows: Section 2 is a Literature Review, which examines relevant studies from the past two to three years since background papers were prepared for a series of short sea shipping workshops that were held across Canada. One member of the study team has attended the two *Journal of Commerce* short sea shipping conferences as well as Ro-Ro 2004, at which short sea shipping was the main theme. In addition, papers from the most recent MARAD conference and the National Marine Conference in Montreal are reviewed. Section 3 deals with the potential market for a Halifax-Hamilton short sea service, both feeder cargo (i.e., international transhipment cargo) and domestic intermodal cargo currently shipped by road or rail. Section 4 examines the technical feasibility and cost structure of the service, including ship, port and Seaway transit costs. It also looks at the issue of winter service via alternative ports. Section 5 presents a brief discussion of current issues relating to supply chain management in both the domestic and international context. Section 6 examines the regulatory and policy environment and the potential hurdles that must be overcome to enable short sea shipping to flourish in Canada. In the last section, we present our Conclusions, including our thoughts on where the true potential for short sea shipping in the Canadian context lies.

2. LITERATURE REVIEW

The consulting team has reviewed more than 60 documents or presentations that have been written or presented on the subject of short sea shipping since 1993. An annotated bibliography of a representative sample of these documents is contained in Appendix A. A summary of the salient issues, especially those relating to marketing, follows.

The papers are from a number of sources and conferences, including two conferences sponsored by the *Journal of Commerce*, one by MARAD, Ro-Ro 2004 in Gothenburg, Sweden, and the National Marine Conference in Montreal in November 2004. A number of background studies commissioned by MARAD and several academic studies were also reviewed.

The literature is very rich, so we concentrated on summarizing items that were of particular relevance to this study and to the issues cited in the Request for Proposals. While the main focus was on marketing, we were also given the task of examining short sea shipping technology, supply chain issues, and both policy and regulatory matters.

The findings are summarized as follows.

2.1 Marketing

- Short sea shipping will be supported as long as it is cost competitive, reliable and fast. North American companies are not yet driven to use alternative means of transportation for purely environmental considerations.

- In Europe, a new trend is for in-house short sea solutions to be brought forward to serve particular industries, companies or product categories, such as forest products and automobiles. These commodities can serve as base loads and be combined with intermodal cargoes. The best example of this is the StoraEnso North Europe Transport Supply System (NETSS), which utilizes purpose-built StoraEnso cargo units (SECUs) carried on new ro-ro vessels built to operate between several Finnish ports and Gothenburg base port, and between Gothenburg and several British and continental ports.

- Short sea shipping should be viewed as complementary to, rather than competing with, truck and rail. Ideally, truckers should be the customers of short sea services, but they have to see real benefits, such as addressing driver shortages, helping retain drivers, or overcoming certain heavily congested corridors.

- There are really two markets for short sea services: international feeder cargo and domestic cargo. The vast majority (90%) of US truck haul traffic is domestic cargo. The two segments could be combined, but in some ways they are more easily handled separately and with different technology, i.e., lo-lo (lift on, lift off) vs. ro-ro (roll on, roll off). The same situation applies to Canada, although the dominant short sea carrier (Oceanex) has built a new vessel, which appears to suggest that the company has concluded that lo-lo is the way forward. Several trucking companies (Armour and Clarke) and large shippers (Canadian Tire) have built fleets of 53 ft. domestic containers that can be carried on the deck of a container ship or as an intermodal rail movement.

2.2 Traffic

- Highway freight traffic throughout the western world during the past several decades has taken modal share from both railway and marine modes. Growth has been so strong that highway capacity has been reached or exceeded in most urbanized settings, especially in northern Europe, coastal United States and the Golden Horseshoe in Ontario.

- In the past decade, short sea shipping in Europe has experienced significant growth and the EC wishes to deflect all new freight growth over the next decade to non-highway modes, with short sea shipping playing a very significant role in this diversion.

- In North America, the door-to-door delivery attributes of trucking have resulted in freight traffic leakage from both rail and marine modes. The amount of coastal freight shipments in the US has not grown since the 1960s; in fact, it has declined.

- Short sea investors and providers must recognize that intermodal cooperation is essential to achieving greater freight volumes. That is, short sea shipping needs to complement, not compete with, the trucking industry to achieve door-to-door deliveries. Knowing freight attributes such as demand volumes, origin/destinations/handling requirements, and supply chain requirements is essential to achieving greater short sea utilization and profitability.

2.3 Operations

- New short sea services are being developed in the Baltic, the Mediterranean, and coastal Western Europe. New terminal and ship designs, incorporating automated guided container handling vehicles, are being prototyped to boost terminal throughput capacity to 500 TEUs per hour and beyond. Development of ports as logistics hubs will be encouraged to avoid the necessity of sending marine freight to inland distribution centres. Administrative and customs bottlenecks are being identified so that mitigation efforts can be undertaken. For instance, the third largest terminal in the Port of Rotterdam in the Netherlands is the Short Sea Shipping Terminal, which handles feeders, river barges and intra-European services.

- In North America, operational developments are definitely more low key, but show some promise. A new container ship MV *Avalon*, built in Germany, has been built for Oceanex for service between Montreal and St. John's, Newfoundland. The Port of New York and New Jersey is implementing a new system for distributing containers to/from inland destinations, using barge and rail in addition to trucks, with the first service implemented by Columbia Coastal between New Jersey and Albany. New services across the Great Lakes both east and west and north and south are being studied (a Lake Ontario-to-New York passenger ferry service has been started, stopped and re-commenced). Likewise, a feeder between Halifax and New England had a six month hiatus last summer and fall, and has resumed with a larger ship in the past six months. In addition, short sea services along the US east coast are being analysed.

2.4 Policy/Legislative Environment

- Both in Europe and North America, aging highway infrastructure is at or beyond capacity and is unable to meet some existing and future demands from freight movements. In addition, social costs associated with roadway freight movements are very high. Both of these factors are causing policy makers to consider and develop measures to shift traffic from highways to other modes. Short sea shipping is believed to be a viable alternative in many cases.

- The EC has undertaken several initiatives to encourage modal switches. The most recent of these is called Marco Polo and consists of three separate thrusts. One of these, Motorways of the Sea, is designed to encourage freight movement on short sea services. It provides capital assistance to selected routes, funding for promotion centres, technological research, and general transportation planning. In terms of this particular study, one must ask whether the European experience and success is policy driven, market driven or geographically driven.

- Canada and the United States have signed a Memorandum of Cooperation to share short sea shipping information and experience.

- Both TC and MARAD are on record as being very supportive of short sea development and have held several conferences/workshops to promote and share short sea experience. The TC-sponsored workshops held in Canada in the fall of 2003 spawned a number of short sea shipping initiatives. In addition, research activities, of which the present study is just one element, have been funded in both jurisdictions.

- Canadian regulations imposing a 25% duty on imported ships and Canadian flag requirements for services involving more than one Canadian port, with their operational impact on crew costs and safety standards, are a disincentive to the establishment of new short sea services.

- The US Merchant Marine Act (Jones Act) restricts service between two US ports to American-built and crewed ships. This imposes severe restrictions on new entrants and vessel construction and operating costs. In addition, the Harbour Maintenance Tax (HMT), designed to fund harbour maintenance activities, is both administratively and financially punitive to short sea freight movements.

- New national security and defence concerns in the US appear to be having a heavy impact on marine freight shipments.

2.5 Other

- The social costs of highway transport are centred on greenhouse gases (GHG) and other noxious gas emissions, as well as noise pollution. On virtually all counts, short sea shipping substantially lowers these costs and is a prime reason for policy makers to encourage redistribution to this mode. Several authors make a strong case that both the social costs of highway movements and the fact that highway users pay a small fraction of these are sufficient cause to promote an active and substantive short sea policy as well as to provide financial support to short sea shipping.

- The profile of the marine mode has been severely eroded, particularly in North America, during the past several decades. Short sea proponents must work harder at promoting its value to shippers and in cooperating with other modes to ensure that door-to-door service will be seamlessly provided.

3. MARKET ANALYSIS

The short sea shipping service that is being examined in this study could be predicated on both domestic cargo and international imports and exports to and from the Hamilton region, which would link up with deep-sea carriers calling at the Port of Halifax. It could also provide intermodal service to the truckers serving the Maritime Provinces and distribution centres operated by major retailers such as Loblaws, Canadian Tire, Sobeys, Home Hardware and Sears in the Maritime region.

3.1 Canadian Container Market

A total of 3.5 million TEUs of container cargo were handled at the five Canadian container ports (Vancouver, Montreal, Halifax, Saint John and St. John's) in 2004, as shown in Table 3.1.

Table 3.1 TEUs of Container Cargo Handled at Canadian Ports, 2004

Port	TEUs
Vancouver	1,664,906
Montreal	1,226,296
Halifax	525,553
Saint John	48,700
St. John's	Est.70,000
Total	**3,535,455**

Source: Various port web sites

3.1.1 Port of Halifax Trade Routes

Halifax's dominant trade lane is the UK/Continent, accounting for 25.6% of its traffic. The Far East is the next largest market, accounting for 16.3%, while the third most important trade route is the rapidly expanding China/Indian sub-continent route, at 13.1%. The port also has strong links to the Middle East, Caribbean and Scandinavia, in which it has a dominant position compared with other Canadian east coast ports. Table 3.2 shows Halifax container traffic by trade route.

Table 3.2 Halifax Container Traffic, Imports and Exports, 2004
(Tonnes, 000s)

Route	Export	Import	Total
UK Continent	469,685	683,675	1,153,360
Mediterranean	222,682	511,684	734,547
China and Indian sub-continent	402,613	185,740	588,353
Far East	351,490	108,450	459,940
Other Canada/US	229,951	30,995	260,946
Caribbean	173,296	69,016	242,313
Middle East	102,746	72,791	175,537
Central America	120,835	40,154	160,989
Scandinavia	32,959	98,566	131,525
South America	107,903	18,255	126,058
Eastern Europe	22,857	1,177	24,034
Africa	17,289	619	17,908
Oceania	1,482	2,092	3,574
Transhipment	245,044	172,995	418,039
Total	**2,500,732**	**1,996,390**	**4,497,123**

Source: Halifax Port Authority

Because Canada is such an export powerhouse, Halifax's trade is very well balanced between exports and imports. In fact, in many cases, empty containers are often repositioned from elsewhere in North America to load exports in Atlantic Canada.

Despite its smaller volumes than Montreal, Halifax offers more liner services to more world ports than any other port in eastern Canada. The carriers listed in Table 3.3 provide direct service via the Port of Halifax.

Table 3.3 Deep-sea Carriers Providing Service via Halifax

Carrier/Alliance	Frequency
ACL	2 x week
Hapag-Lloyd (GA)	4 x week
P&O Nedlloyd (GA)	4 x week
NYK Line (GA)	4 x week
OOCL (GA)	4 x week
Zim	2 x week
China Shipping (Zim)	2 x week
Costa	Every 10 days
Melfi	Every 10 days
Wallenius Wilhelmsen	2 x month
Oldendorff Indotrans	Every 16 days
NSCSA	Every 12 days
Halship (feeder)	1 x week
Oceanex (feeder)	2 x week

Source: www.portofhalifax.ca and *Canadian Sailings*

3.1.2 Port of Halifax Markets

The Port of Halifax serves four major geographic markets, as Table 3.4 illustrates.

Table 3.4 Major Markets Served by Port of Halifax

Market	Population (millions)
Atlantic Canada	2.3
Quebec	7.4
Ontario	11.8
US Midwest	67.9

Sources: Statistics Canada, Census of Canada, 2001; US Census, 2000

Most of Halifax's cargo is origin/destination Atlantic Provinces, Quebec and Ontario. The Maritime Provinces (Nova Scotia, New Brunswick, PEI) are served by truck. Quebec, Ontario and the US Midwest are served by rail.

With a bi-weekly feeder service, Halifax also handles cargo moving between the Canadian mainland and the Island of Newfoundland, of which a significant portion is overseas transhipment cargo. It also handles cargo to New England, Portland and Boston cargo via feeder. Another weekly service provides transhipment service to Saint-Pierre et Miquelon.

Table 3.5 Halifax Container Tonnage by Origin or Destination, 2004

Province or State	Tonnes	TEUs
		(10 tonnes per TEU)
Total Atlantic Canada	**848,698**	**84,870**
Quebec	903,729	90,373
Ontario	953,010	95,301
Western Canada	203,640	20,364
Total Inland Canada	**2,060,379**	**206,037**
Total Canada	**2,909,077**	**290,907**
Midwest US	724,485	72,448
New England	345,381	34,538
Rest of US	527,533	52,753
Total US	**1,597,399**	**159,739**
Other	527,533	52,753
Total	**4,506,478**	**450,649**

Source: Halifax Port Authority

For a Halifax-Hamilton feeder, the primary market would be Ontario. Total international cargo rail volume to these markets is about 95,000 full TEUs and approximately 20,000 empties.

3.2 Domestic Cargo

In addition to transhipment cargo carried by deep-sea carriers, there may be opportunities to develop domestic markets by offering the service to trucking companies or large retailers with operations in Atlantic Canada. This cargo is currently trucked directly from central Canada or utilizes CN's intermodal service and terminal at Richmond Terminals in the Port of Halifax, which handles about 25,000 units per annum.

3.2.1 Domestic Intermodal

Total domestic intermodal rail freight to, from, and within the Atlantic region amounts is quite substantial, as shown in Table 3.6.

Table 3.6 Atlantic Region Domestic Rail Cargo

Origin & Destination	Tonnes			
	From		To	
	COFC	TOFC	COFC	TOFC
Atlantic	861,398	30,316	60,852	2,708
Quebec	205	91	861,398	30,316
Ontario	1,205,204	154,907	717,850	64,937
Manitoba	171,226	2,774	50,527	175
Saskatchewan	73,355	253	40,311	723
Alberta	570,132	5,236	31,660	194
BC	1,175,913	2,746	321,804	1,304
US + Mexico	2,011,241	27,660	2,135,681	100,358
Total	**6,068,673**	**223,984**	**3,135,681**	**100,358**

Source: Statistics Canada, Rail in Canada, 2002, Table 14-1, pp. 34-37.

Total container on flat car (COFC) movements to and from Atlantic Canada amount to 9.2 million tonnes. Trailer on flat car (TOFC) amounts to another 324,342 tonnes. Besides the US and Mexico, the biggest market is Ontario, representing 1.9 million tonnes of COFC and 219,844 tonnes of TOFC.

Based on a 35,000 lb. trailer load, total Ontario-based movements could amount to 95,000 loads. Quebec-based cargo is limited in an eastbound direction, but could amount to 39,000 loads westbound. Many trucks move full eastbound and empty westbound. Some carriers also triangulate between the Maritimes, New England, central Canada and the Maritimes. These operators would be difficult to attract to the service unless their units are only carried in one direction.

The difficulty with this data is determining how much of the Ontario- and Quebec-based cargo is moving to Moncton vs. Halifax. Halifax is the largest city and metropolitan region in Atlantic Canada and the 13th largest city in Canada. It has a total population of 360,000 people in a province of 942,000. Its importance as a distribution centre is reflected in its ranking amongst the largest census areas by originating and destination truck movements.

Table 3.7 Ranking of Halifax Census Metropolitan Area by Originating and Destination Movements

	Tonnes	Rank	# shipments	Rank
Destination	2,007,000	12	686,000	7
Origin	2,137,000	11	898,000	6

Source: Statistics Canada, Trucking in Canada, 2003, Table, 3.7, p. 52, Table 3.8, p. 53.

Statistics Canada annually compiles movements of "for hire" trucking companies between various Canadian and US jurisdictions/regions. The latest available Statistics Canada data is for 2003. Unfortunately, data for Nova Scotia origin/destinations is masked in Atlantic Region totals from the official publication. The consulting team, in order to get a better view of provincial and metropolitan area "for hire" trucking movements, purchased two custom runs of data from Statistics Canada: detailed information for individual Atlantic Region provinces; and information for census metropolitan areas (CMAs) relevant to the current study.

Table 3.8 illustrates origin/destination data for Nova Scotia trucking movements in aggregate. Since movements to/from provinces such as New Brunswick and Prince Edward Island have little relevance to a possible Halifax-to-Hamilton short sea shipping service, they are not included in the table. Truck traffic originating in Nova Scotia and destined for Quebec and Ontario amounted to 330,000 tonnes and 286,000 tonnes, respectively, in 2003. In the reverse direction, that is traffic travelling to Nova Scotia from Quebec and Ontario, substantially higher volumes were recorded (593,000 tonnes and 772,000 tonnes, respectively). Inbound movements to Nova Scotia from central Canada exceeded outbound movements by a factor of 2.2:1.0. Of further interest is the large amount of traffic moving from Nova Scotia to the US (496,000 tonnes) and traffic from the US to Nova Scotia (379,000 tonnes). As one might expect, there is a limited amount of traffic to/from Western Canada.

Table 3.8 For Hire Trucking Tonnages for Selected Provinces, 2003

	Quebec	Ontario	Western Canada	United States	Totals
Origin					
Nova Scotia	330,000	286,000	16,000	496,000	1,128,000
Destination					
Nova Scotia	593,000	772,000	15,000	279,000	1,759,000

Source: Custom Run by Statistics Canada for this project

While the data in Table 3.8 is useful in gauging general trends, it provides little clarification concerning traffic to/from urban areas such as Halifax and Hamilton. The second custom run of Statistics Canada data, for traffic between CMAs, was requested to provide additional explanation. Table 3.9 illustrates traffic to/from Halifax to 11 CMAs in Quebec and Southern Ontario. Of particular interest are the rather large movements between Montreal (Halifax outbound – 103,420 tonnes, Halifax inbound – 315,655 tonnes) and Toronto (Halifax outbound – 112,156 tonnes, Halifax inbound – 314,763 tonnes) and the rather small movements between Halifax and Hamilton (Halifax outbound – 1,229 tonnes, Halifax inbound – 7,774 tonnes). Ontario CMAs to the south and west of Hamilton, such as London, Kitchener, Windsor and St. Catharines/Niagara, also registered limited traffic levels.

It is worthy to note that Halifax origin traffic to the three CMAs in Quebec (Montreal, Quebec City and Trois Rivières) amounted to some 34% of total Nova Scotia-to-Quebec traffic. In the reverse direction traffic from the three Quebec CMAs amounted to 54.5% of total Quebec-to-Nova Scotia traffic. Similarly, for the eight Ontario CMAs, Halifax outbound traffic amounted to 41% of total Nova Scotia-to-Ontario traffic, and for Halifax inbound shipments, the eight CMAs account for 45% of Ontario-to-Nova Scotia traffic.

The Statistics Canada data also allowed for an inspection of Halifax to/from major regions in the US. This revealed that very small amounts of traffic to/from the Halifax CMA is occurring between US regions. The rather large volumes between Nova Scotia and the US are believed to be partially explained by outbound fish products from southwestern Nova Scotia.

Table 3.9 For Hire Trucking Tonnages for Census Metropolitan Areas, 2003

CMA	Origin: Halifax	Destination: Halifax
Trois Rivières	109	-
Quebec City	8,230	7,669
Montreal	103,420	315,655
Ottawa/Hull	1,319	5,344
Oshawa	3,755	2,846
Toronto	112,156	314,763
Hamilton	1,299	7,774
St. Catharines/Niagara	3,824	215
London	40	-
Kitchener	1,087	10,752
Windsor	249	6,698
Total	**235,488**	**671,716**

Source: Custom Run by Statistics Canada for this project

From this analysis, we can conclude:

- There is a high west-to-east bias in truck movements;
- There are large volumes of traffic between Halifax, Montreal and Toronto, with very low volumes of traffic between Halifax and Hamilton and points south and west;
- Provided a significant portion of truck traffic could be attracted, a short sea shipping service between Halifax and Hamilton would benefit from a stop in Montreal;
- The question of whether a Hamilton-based service would attract Toronto area traffic, without a direct stop, needs to be addressed. At the very least, we need to consider whether Toronto-based traffic could be served via Hamilton.

3.3 Market Summary

There is a substantial volume of cargo available for a potential Halifax-Great Lakes feeder service to and from Hamilton, for both international and domestic cargo, which is currently handled by rail, truck, COFC and TOFC.

This is summarized in Table 3.10.

Table 3.10 Market Summary

Market	Location	Volume (# units)
International	Ontario/Halifax	95,000 TEUs
Domestic		
HIT (CN)	Ontario/Quebec	25,000 48ft. and 53ft.
Truck	Ontario/Halifax	30,500 48ft. and 53ft.
Total		**150,500 units**

Unfortunately, this data somewhat overstates the potential market for a feeder service based on the Halifax market, as both the trucking data and the intermodal data are for the whole Atlantic Region. Newfoundland cargo can be quite easily removed from the data, but both New Brunswick and PEI are more difficult to extrapolate. With some additional effort, we may be able to further refine these numbers.

What is also not clear is how much of the Ontario market originates from or is destined to the Hamilton area and to what extent consignees and shippers would be advantaged or disadvantaged by a Hamilton port call. Many distribution warehouses are in the vicinity of CN's Concord intermodal rail terminal.

Hamilton is an industrial centre, as is southwestern Ontario from Mississauga in a westerly direction. There are several automotive plants and many large shippers in this region. We attempted to obtain origin/destination data from the Ontario Ministry of Transportation but this data does not exist. A closer analysis of Port of Halifax bills of lading could provide this information should the concept of a Halifax-Hamilton feeder prove feasible from an economic standpoint. At this time, the data is confidential.

In terms of an overall strategy, the service could be marketed to deep-sea carriers serving Halifax and it could be wholesaled to truckers and major shippers with their own equipment who are operating in the central Canada–Maritime Provinces trade lane and eventually, the US Midwest–Maritime Provinces. There are also major retailers who operate their own trucking fleets and who could be approached regarding short sea shipping.

Whether such a service could be competitive with rail and truck depends on further analysis of ship costs and terminal operations. In the meantime, section 4 summarizes discussions and analysis pertaining to these markets.

3.4 Major Trucking Firms in Atlantic Canada

In order to incorporate a domestic shipping component, short sea service will need the support of one or more of the major trucking firms serving that market. They include at least those shown in Table 3.11.

Table 3.11 Major Trucking Firms Serving Atlantic Canada

Company	Terminal Locations
Armour	Moncton, Dartmouth
Midland	Moncton, Dartmouth
Day & Ross	Florenceville, Moncton, Dartmouth
Clarke	Halifax
Maritime-Ontario	Dartmouth

3.5 Distribution Activity in Atlantic Canada

There are two main distribution centres in Atlantic Canada: Moncton and Halifax. St. John's functions as Newfoundland and Labrador's distribution centre. Moncton is at the geographic centre of the Maritimes, but Halifax is the largest market. Major retailers tend to have distribution warehouses located in both cities, as shown in Table 3.12.

Table 3.12 Major Retailers with Atlantic Region Distribution Centres

Company	Location
Loblaws/Atlantic Wholesalers	Halifax, NS; Moncton, NB
Sobeys	Halifax, Debert, Stellarton, NS
Sears	Dartmouth, NS
Home Hardware	Debert, NS
Kent Building Supplies	Moncton, NB
Co-op Atlantic	Moncton, NB

There are also a number of major retailers who do not have warehouses in the region, and who truck back and forth between central Canada and the Maritimes. Often, they are full eastbound and are returning empty westbound.

In the past year, the Port of Halifax has been endeavouring to increase the level of distribution activity taking place in the Halifax Regional Municipality, with the view that it will lead to increased shipments of containerized cargo in the region. A recent study done by MariNova Consulting Ltd. identified several retailers who are interested in transloading containers and trailers at Halifax, thus making better use of equipment. Basically, import containers would be destuffed in Halifax and local cargo distributed by truck. Cargo destined for central Canada would be re-loaded into a domestic trailer and either taken directly to the retail outlet or distribution centre. These trailers could be trucked, railed or shipped by water to central Canada. The empty container would then be filled with local Atlantic region cargo.

Major Canadian retailers without Atlantic Region distribution centres include:

- Canadian Tire
- Wal-Mart
- Hudson's Bay/Zeller's
- Home Depot
- Costco
- Staples/Business Depot
- Canadian Retail Shippers Association (CRSA)

Since the present study commenced, CRSA has announced that it will begin to ship 4,000 TEUs per annum through Halifax, and their containers will be transloaded at a facility owned by Armour Transportation Systems before moving to markets in central Canada.

3.6 Shipping Lines

The following steamship companies were contacted regarding their interest in a Halifax-Hamilton container feeder service. They represent 90% of the container volume at Halifax.

- Hapag Lloyd AG
- P&O Nedlloyd
- Orient Overseas Container Line (OOCL)
- NYK Line
- Atlantic Container Line (ACL)
- Zim Container Service
- Costa Container Line

Since the study commenced, Maersk-Sealand has withdrawn service to Halifax and has also announced it intends to purchase its rival P&O Nedlloyd, which is a member of the Grand Alliance (GA) with Hapag Lloyd, NYK Line and OOCL. The implications of this development for the Port of Halifax and the Grand Alliance are not yet clear. In recent weeks, the port has also attracted a new shipping service operated by China Shipping Container Line, which will operate a westbound round-the-world service via the Suez Canal.

Most carriers that were contacted for this study are interested in such a service, but are concerned about three issues: cost, reliability and winter service. Consistency is now as important as timeliness and speed. When CN introduced its Intermodal Excellence (IMX) Service, it promised 90% of all containers would move within 48 hours. The reality is more like four days. Thus, a feeder transit time of five days directly from the mother ship to pier in Hamilton would be competitive with actual performance of the railway at present.

All of the shipping lines we spoke with are interested in having an alternative to CN's service between Halifax and central Canada, which, in their view, has deteriorated in the past 36 to 24 months. However, they do not think it worth the risk if a solution to winter operations on the Seaway cannot be found. Operating the vessel to Montreal or environs in winter and then trucking from there is seen to be cost prohibitive.

One potential problem for a feeder operator is that the largest carriers tend to pay the lowest rates to CN, and thus there is likely to be less "wiggle room" in terms of rate negotiations. Rail rates are also based on volume, so any volume moved by feeder would affect the rest of a carrier's volume. One concern is that a successful feeder could carry 25 to 30% of CN's existing Toronto volume. What impact would this have on service and rates thereafter? Another carrier expressed some concern regarding CN's response to moving the rest of its cargo that did not move on the feeder. Would CN be interested in it? Likewise, if it moved 100% of its cargo with CN only in winter, would CN be interested?

Most carriers suggested that rates would have to be 10 to 15% below existing rail rates, but one large carrier said they could be the same, as long as the feeder service provided an alternative. Because of the nature of the trade, a feeder would also need an empty container rate that was lower than a full rate. This is problematic because Canadian container terminal operators do not tend to provide significantly lower rates on "empty" moves. Canadian law prohibits the use of international containers for domestic cargo, but truckers can use them for a move that is going to another location where they will pick up freight for overseas shipment. In this context, Toronto to Halifax fits within the regulations.

Most carriers also suggested that the service would have to be at least weekly, and built around a particular mother ship call. The question is: which one? There are five potential answers: 1) Zim east or westbound; 2) Grand Alliance AEX service east or westbound; 3) Grand Alliance PEX service east or westbound; 4) ACL east or westbound, or 5) China Shipping westbound. Present schedules are shown in Table 3.13.

Table 3.13 Schedules of "Mother Ship" Calls at Port of Halifax

Shipping Line	Service	
	Eastbound	Westbound
Zim	Saturday	Friday
Grand Alliance AEX	Friday	Wednesday
Grand Alliance PAX	Saturday	Saturday
ACL	Monday	Sunday
China Shipping		Thursday

The most important in terms of transit times and connecting with a particular mother ship call are the westbound services, which tend to carry high value import cargo. Thus, a service that called at Halifax between Friday and Sunday, and that returned by the following Friday could meet most of the requirements of the trade. Another factor is late cutoff times for time sensitive cargo, which would be difficult to accommodate with a feeder needing five days to reach Halifax from Hamilton. This cargo would most likely continue to move by rail or even truck.

The situation is somewhat complicated by the fact that Zim calls at Halterm in the South End and the other three companies call at CeresGlobal at Fairview Cove. To incorporate both services would necessitate moving the vessel, paying for pilotage and lines, and incurring extra costs. If Zim did not commit to the service, the vessel could arrive Saturday and leave with imports from three vessels on Sunday. This is also the schedule of another feeder operator, which serves the New England market. Whether there would be room on the berth for both vessels and a mother ship would have to be determined. Conversely, if only Zim committed to the service, the vessel could arrive on Thursday and sail on Friday after the mother ship has discharged its cargo.

3.7 Truckers

The trucking industry between central Canada and the Maritimes is dominated by the Irving group, the McCain group, and several independents, including Armour Transportation, Clarke Transport and Maritime-Ontario. In terms of short sea shipping, many companies, including Armour, Midland, Clarke, Maritime-Ontario and Canadian Tire, have purchased fleets of 53 ft. domestic intermodal containers for use on CN's intermodal service and between the mainland and Newfoundland. These containers are longer and wider than regular ISO international containers, and allow for the carriage of the same amount of cargo as a regular 53 ft. highway trailer. They would appear to be the best candidates for this type of service.

Opinion is generally split as to whether a Halifax-Hamilton short sea service could work for the trucking industry. One consideration is that intermodal rail service to the trucking industry has not really improved in the past 12 months, compared to what it was prior to the introduction of CN's IMX Service. Some companies are experiencing a shortage of

drivers and at least one is bringing in new immigrants from Eastern Europe to fill these positions.

In terms of a rate threshold, one trucker and an intermodal shipper said it would not be of interest or benefit at the same rate as they are currently paying CN, particularly when CN has a daily service.

3.8 Retailers

We discussed the concept with several retailers, distributors and 3PLs, including:

- Loblaws
- Canadian Tire Corporation
- Sears/CRSA
- HBC Logistics
- Wal-Mart
- FastFrate

Attempts were made to contact several others, but with no success.

The response from the shippers was quite mixed. Many of these companies are looking at the whole supply chain, particularly as it relates to imports from China. West Coast ports have been heavily congested, with *force majeure* having been declared at one terminal in Vancouver early in 2005. They are looking at the Halifax gateway, as well as the announced terminal in Prince Rupert, but also US gateways such as New York, Norfolk, Seattle and Tacoma. Most Halifax carriers are currently sailing full and the port either needs to attract additional carriers such as China Shipping or its existing carriers need bigger vessels in order to attract more cargo, particularly Suez services.

The shippers tended to view the short sea option more favourably for international cargo than for domestic moves, because they see it as an alternative to rail. For domestic moves, they require fast service from Toronto or Montreal at least five days per week. One shipper said it could live with higher rates, provided the service and reliability were good.

3.9 Other Ports of Call

Given that the Seaway is not available for year-round navigation and that the rail alternative to/from Halifax is efficient from a cost/transit time perspective (despite frequent delays at times), other ports of call may add to the attractiveness and viability of a short sea service.

We have considered one such additional port of call, Sept-Îles, which is located on the north shore of the Gulf of St. Lawrence and is best known as the port city for the iron ore mines in Labrador. It is also the site of Aluminerie Allouette, a major aluminum producer. Nearby there is the town of Port Cartier, which is also a port city for an iron ore mining company. The Port Cartier area also produces certain wood products for export. Its geography makes it the natural distribution point for the cities and towns on the lower North Shore.

All transportation modes meet in Sept-Îles. At one time, the Quebec North Shore and Labrador Railway (QNS&L) was, other than airfreight, the only way to get to Labrador and Northern Quebec year round. There is now a road between Baie-Comeau (another potential port of call) and Fermont, which provides another access to the area.

3.9.1 Volumes

A short sea service call to/from Sept-Îles could be attractive for the export of aluminium ingots to either the Great Lakes/Montreal or to Halifax where the product could be transhipped to the US East Coast or to other continents. Additionally there is a significant amount of heavy industry in the local area that requires parts, and supplies. Finally there is the freight directly associated with the consumer base of the area.

The estimated total freight that could move intermodally is as shown in Table 3.14. We have made a conservative assumption as to the percentage of traffic that would be attracted to a short sea service.

Table 3.14 Potential Cargo, Sept-Îles Port of Call

		Tonnes/ year	TEUs per year	Assumed share	Potential TEUs
Large exporters	Aluminum	250,000	16,667	30%	5,000
	Wood products	100,000	6,667	10%	667
Industrial parts and supplies		20,000	1,333	15%	200
Consumer products	Local area		11,200	15%	1,680
	Lower North Shore		4,200	15%	630
	Labrador		7,000	25%	1,750
	Northern Quebec		2,800	25%	700
				Total	**10,627**

3.9.2 Potential Sept-Îles Cargo

QNS&L has never been particularly interested in the movement of general freight, but has provided the service as part of its duty as a common carrier and because it had an obligation to supply its own mining towns. There is a new railway being formed, initially to provide passenger and freight service on a part of the existing track, but if things work out as expected, it would like to take over all the rail freight.

Alouette is presently doubling its production capacity. A new mining venture has been announced that would use a pipeline to carry ore from Shefferville to Sept-Îles. There is some interest in making Shefferville a centre for air freight distribution for the northern communities that do not have road or rail access.

3.10 Conclusion

Based on our research, there appears to be sufficient cargo available for a Halifax-Hamilton feeder service.

The international steamship companies are interested in the concept of a Halifax-Hamilton feeder service because it gives them an alternative and some leverage with CN. However, it would have to be provided at a rate that was at least 10 to 15% lower than rail rates. The service would also have to be regular, reliable and weekly. The operator would have to find an economical solution to winter service, as cargo cannot be stockpiled at a downstream port for onward shipment in the spring.

Intermodal shippers, including both truckers and retailers, appear to need more convincing to give a concept such as short sea shipping a trial. They are equally concerned with reliability and service, and price is also a consideration, but they also need frequency.

The truckers we spoke with said they are concerned about driver shortages and CN's intermodal service levels, but that short sea shipping could not be too much more expensive than either trucking or rail intermodal.

4. INFRASTRUCTURE, ECONOMIC AND VESSEL TECHNICAL ANALYSIS

This section of the report analyses the economics and technical feasibility of a short sea feeder service between Halifax and Hamilton. It examines port infrastructure in both Halifax and Hamilton, the economics of operating vessels between those two ports, including Seaway costs, and the cost to operate both second-hand and new tonnage appropriate to such a service.

4.1 Infrastructure

4.1.1 Port of Halifax

Halifax is the third largest container port in Canada, behind Vancouver and Montreal. In 2004, it handled about 525,000 TEUs of container cargo, or 350,000 "lifts". The port has two common user container terminals, operated by Halterm Ltd. and CeresGlobal Terminals.

Halterm, located in the South End adjacent to the sea lanes, is a 75 acre terminal equipped with six container gantry cranes, including two post-Panamax units. Halterm's present customers include Zim, Costa, Melfi Lines, Oceanex and China Shipping. The terminal is operating at about 35% capacity, having lost several customers in the past two years.

CeresGlobal is located at Fairview Cove in Bedford Basin, a ½ hour steam from Halterm. It is a 70 acre terminal equipped with four container gantry cranes, including one post-Panamax unit. CeresGlobal is operating close to capacity. Its customers include the four members of the Grand Alliance (Hapag Lloyd, P&O Nedlloyd, NYK Line and OOCL), with four ship calls per week, and Atlantic Container Line, with two ship calls per week. Ceres also handles feeder cargo carried to New England by Halship Inc., a Halifax-New England feeder operator.

Already in the short sea feeder business, the ongoing development of a short sea network could enhance Halifax's container throughput. Both terminal operators are keen to accommodate a Halifax-Hamilton feeder operation, as it represents significant additional lifts and incremental revenue for their terminals.

Lift costs at both terminals in Halifax would be approximately $175 if worked in straight time. If the vessel works on weekends or evenings, the cost could be another $25 or more. Total Halifax port costs are about $200 per container in straight time and $225 per container if overtime is incurred.

4.1.2 Port of Hamilton

The Port of Hamilton is primarily a bulk port, handling about 12 million tonnes of cargo per annum. It has been working on developing short sea services on the Great Lakes and through the Seaway. It is also working on developing ferry services across Lake Ontario to Oswego, New York.

Port management has identified one location for a ferry terminal and another for a short sea terminal. The site is approximately 15 acres and would be quite adequate for the purpose. It is reasonably close to a major highway but not as close as the ferry terminal

would be. The port or terminal operator would need to supply cranes. There are two stevedoring companies interested in the business, one of which we spoke with.

The stevedoring company in Hamilton with whom we spoke indicated that lift costs could be expected to be about $135, and the port indicated that total costs per container could be expected to be about $175. The stevedoring company indicated that it would likely use mobile cranes at the terminal, similar to the ones used by Logistec Stevedoring at both Halifax and St. John's.

4.2 Feeder Vessels

The choice of a vessel for a feeder service such as the one contemplated between Halifax and Hamilton is dependent on a large number of factors, many of which are driven by either the marketplace or the environment.

The marketplace (shippers in particular) is looking for the proper combination of timeliness and cost. Short sea shipping is generally slower and less frequent than rail or road. The volume of freight handled on a single bloc (typically 400-1,000 TEUs) restricts the frequency of shipments compared to other competitive modes of intermodal transport. Trucking typically handles two TEUs at a time and intermodal trains handle roughly 250 TEUs per train.

Currently the vast majority of international intermodal cargo transiting the Halifax Hamilton corridor is moved by rail. CN service standard provides two trains per day seven days per week and offers a transit time of some 48 hours, but in reality this is at least 72 hours. Trucks are a much more expensive alternative and are used in exceptional cases, such as a shipment that has been delayed or time sensitive cargoes shipped close to an absolute deadline, and the cost for such a service is $2,000 to $3,000 per container one way.

Table 4.1 compares transit times and labour productivity by transportation mode in the Halifax-Hamilton corridor.

Table 4.1 Modal Efficiency: Transit and Productivity

Mode	Capacity TEUs	Speed km/h	Transit times (days)	Manning	Man-days per 1000 TEU
Truck	2	50	1.5	1	1,000
Rail	250	45	2	4	32
Water (large vessel)	1,000	19	8	21	168
Water (small vessel)	400	12	8	10	200

Short sea shipping nevertheless offers some significant benefits in terms of energy efficiency, reduced GHG emissions and reduced risks. Table 4.2 provides a relative comparison between modes of inland transport (normalized against the marine mode).

Table 4.2 Relative Modal Efficiency: Environment

Mode	Fuel consumption	Emissions	Accidents	Spills
Truck	9.7	7.6	74.7	37.5
Rail	2.2	1.4	13.7	10
Marine	1	1	1	1

Source: SODES, *Etude comparative des impacts environnementaux des modes de transport dans l'axe du Saint Laurent*, 2001

4.2.1 Frequency

Many industrial and commercial entities operate on a repetitive weekly schedule, and a weekly service is considered essential to capture and maintain market share. Most international shipping services operate on this basis. A feeder operation that did not match the larger ship's call and offered less than a weekly schedule would add a significant amount of time and variability to the cargo's transit time.

For example, a weekly short sea service properly timed with its mainline customer could provide an effective transit time of eight days plus or minus one day (seven to nine days), whereas a feeder on an eight day schedule would delay the freight an average of 3.5 days and provide an effective transit time of 11.5 days plus or minus 3.5 days (8 to 14 days).

4.2.2 Ship Size

Economies of scale

The larger the vessel, the better the per-unit costs. Capital cost, crew costs and fuel costs do not increase in proportion to the vessel's capacity. Larger vessels also tend to have better speed than smaller ones because of their longer waterlines.

Scale vs. frequency

The larger the vessels, the lower the frequency to handle the same volume. This creates a barrier to entry into shipping routes as the volume of cargo must be sufficient to enter the market with an economically sized vessel. Typically, shipping lines will enter a new market with the smallest vessels that meet their economic requirements and then grow the service by increasing ship size. The cost of importing tonnage into Canada makes this practice unfeasible as the duty costs would be wasted every time the ship grew in size. This situation significantly adds to the barriers to entry into domestic shipping.

Handling

Handling containers on and off vessels is one of the major costs associated with a feeder or short sea service. The basic handling rate is often only a portion of the real cost of handling a container through a marine terminal. To avoid overtime rates in Halifax (1.5 times normal rate or more), the number of handlings should be kept to less than 400 per call. Assuming that the call is balanced, that the schedule allows a starting time of 8 a.m. on a workday and that two cranes can be used efficiently (25 lifts per hour each) for the entire time worked, overtime can be avoided entirely. This, however, is a

relatively small load of some 320 TEUs each way, approximately what a 400 TEU (nominal) ship would carry.

Based on the same reasoning, the next optimum size would be 600 handlings or 480 TEUs each way (600 TEU nominal), with one third of the cargo handled at 1.5 times normal time rates. Likewise, a vessel of 750-800 TEUs would also incur overtime.

Achievable speed requirement

At 1,272 nmi of steaming, the requirement for a weekly reliable service requires a ship cycle of less than 14 days. The cycle time is obviously a function of the speed but also of the required time in port for the handling of containers. While the actual productivity required per working hour is 50 lifts per hour (25 per crane), our model used an effective rate of 20 lifts per hour to take into account waiting time, meal hours, etc.

This model in Figure 1 shows that achieving a weekly schedule with two ships carrying 1,000 TEUs would require a cruising speed of 19 kn, while 400 TEU ships would need to maintain 12 kn while underway.

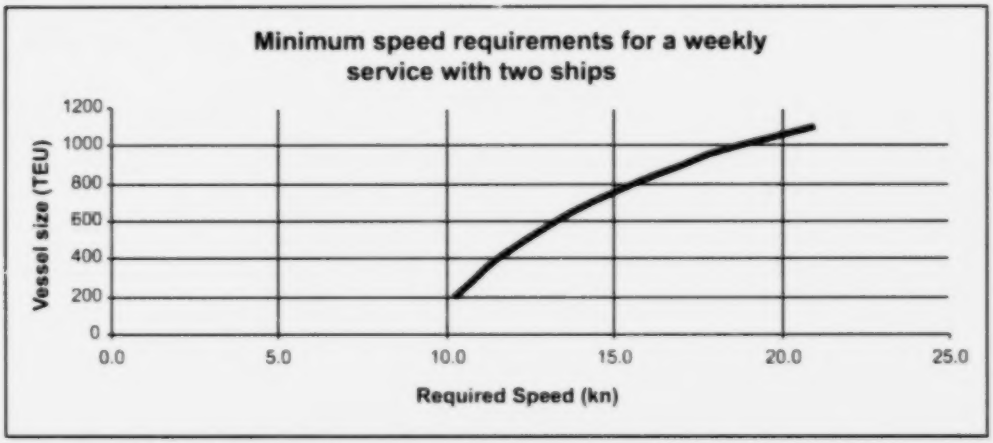

Figure 4.1 Minimum Speed Requirements for a Weekly Feeder Service

4.2.3 Other Ship Requirements

Width

The maximum breadth the Seaway will accept is 78 ft. Many ships are designed to take advantage of this dimension; however, it is recommended that the width of short sea intermodal ships be somewhat less than this maximum dimension. The ice buildup on the walls of the locks in freezing conditions can slow the passage through the locks, and the advantage for an intermodal ship of utilizing the full width is questionable. A maximum width overall of 22 m (73 ft.) is therefore recommended.

Ice Class

Ice class 1A is recommended on this service. While this class is not a requirement *per se*, weekly operation in ice flows in the Gulf of St. Lawrence and St. Lawrence River during winter months will take its toll on the vessels deployed in this service, and the higher design and construction standard will result in a lower life-cycle cost. Many companies, such as Oceanex, Wagenborg Shipping, B&N, DFDS, etc., have gradually shifted to this higher ice class for their fleets.

Draft

Draft should be limited to 8 m or less to allow access to a variety of smaller ports and maximize the flexibility of the vessel (and ultimately its residual value). However, CSL and other operators now have permission to transit the Seaway at 26.5 ft. (8.03 m) and we understand from Seaway authorities that this may be extended further in the future.

Configuration

The ship or barge should be designed to require a minimum of lashing and have the ability to carry 20 and 40 ft. ISO containers as well as 53 ft. pallet-wide domestic containers. The new vessel recently delivered for Oceanex has moveable cell guides that allow bays to be converted from one type of container to the other. Such innovative solutions can be found but require a purpose-designed ship or barge. A similar pair of 804 TEU vessels has been delivered to Geest North Sea Line in the Netherlands in the past six months.

Most existing vessels are designed for ISO containers, and on-deck containers are lashed in blocs. Changing the deck layout to accept domestic containers is normally possible, although some loss of capacity can be expected. Below deck cell guides would minimize lashing requirements and ensure higher loading and unloading productivity, but would allow only ISO containers to be carried below deck. To be competitive with rail, the vessel should also be capable of carrying some amount of hazardous cargo.

Temperature-sensitive cargoes

The number of reefer plugs required on the vessel will very much depend on the market targeted by the service. Most ships have about a 10% capacity for refrigerated cargo and this should be sufficient, since this type of cargo is generally more time sensitive and tends to move over other more rapid transportation modes.

Below deck, it would be relatively easy to provide "keep from freezing" capacity by installing heaters to ensure the temperature is kept above the freezing point when the hatch is closed, even in winter months.

4.2.4 Manning/Automation

Existing legislation requires that the country of registration issue a "Minimum Safe Manning" document. It is expected that with unmanned engine room spaces and advanced navigation equipment, as well as flexible job descriptions for the crew, the manning on a ship could be kept to 10.

Some foreign flagged ships have crews of eight and are accepted into the Seaway. At present, the European style of crewing motorized barges would not meet Canadian standards for crewing.

Crewing requirements for tugs can be somewhat lower, as the "Minimum Safe Manning" requirement applies only to the tug (if the barge is unmanned) and is not required if the tug's GRT is less than 500 tonnes.

4.3 Vessel Costs

We obtained sample charter rates[5] from two brokers on a variety of vessels suitable for this type of service. Because of their cost to operate and the length of the voyage, we did not analyse the cost of ro-ro vessels. We concentrated on three sizes – 450, 600 and 750 TEUs – and obtained the data found in Table 4.3.

Table 4.3 Vessel Costs

Name	Size (TEU)	Sale price	Daily timecharter cost
Merita	332		US$5,700
Pretty Wave	316		US$7,250
J Glory	357		US$8,700
Shamrock	396	US$11.0 million	US$7,900
Pretty Lake	420		US$9,000
Anna Gabriele	450		US$9,025
Gerda	508		€ 7,500
Marcliff	511	US$13.0 million	
Luwin	516	US$8.5 million	
Ossian	518		US$8,900
Pioneer Sky	536	US$11.0 million	
Range	636	US$7.0 m million	
Stamatina	524	US$9.4 m million	
Great Mary	650	US$4.25 million	
Mill	772	US$5.2 million	
Geestdijk	804 (new)	US$18.0 million	

Sources: Clarkson Research Services; S. Danoff ShipBrokers

Vessels in the 450 to 750 TEU size range have been timechartering (includes crew) at US$9,000 to $12,000, for a minimum 12 to 24 months charter period, for most of 2005. This is up from $5,000 to $7,500 in the past 18 months.

To the cost of either chartering or purchasing a vessel must be added 25% duty in the case of purchasing, or 1/120 of the value of the duty in the case of chartering on the short term, which is payable monthly. Canadianizing a second-hand vessel to meet Transport Canada Marine Safety regulations will add a further $1.5 million on average. This cost must be incurred before the vessel starts trading in Canadian waters. If the modifications are done outside the country, a 25% duty is payable. The cost to undertake these modifications is likely to be borne by the charterer and will have to be done after the charter comes into effect, which will be non-revenue time.

[5] As of May 2005.

Canadian crews will cost about 250% more than foreign crews. For example, a foreign flag vessel such as the 450 TEU MV *Anna Gabriele* at US$9,025 per day will have crew costs of about US$1,200, whereas an equivalent Canadian crew will cost US$3,700. Thus, a foreign flag vessel at US$9,025 will cost US$11,985 before paying duty. If the vessel is worth US$10 million, it will cost an additional US$666 per day, including the 1/120 duty. If the TC Marine Safety modifications are done before arriving in Canada, the cost of the vessel becomes $11.5 million. Duty therefore becomes US$798. The total charter cost will therefore be US$11,985 + $798 or US$12,783 per day. At present exchange rates of $1.20, this is the equivalent of C$15,339.

In addition, we obtained pricing information from two tug and barge operators, as shown in Table 4.4.

Table 4.4 Tug and Barge Charter Costs

	Operator A	Operator B
Tug	$10,000	$7,500-$8,000
Barge	$4,500	$1,500-$2,000
Fuel	$9,216	$4,500
Total	**$23,716**	**$13,500-$14,500**

Operator A's tug burns 16 tonnes MDO per day and the barge could carry approximately 400 containers. Speed would be limited to 10 kn and Operator A could therefore reach Hamilton in 5.3 days, based on continuous sailing. Operator B's tug burns $4,500 per day in fuel, based on present day prices. This combination can operate at 8 kn, which, based on continuous operation, would be 6.6 days sailing. With lock transits and potential delays, particularly in inclement weather during spring and fall, it is doubtful either of these options could provide reliable seven day service.

Another potential scenario could be to have multiple barges, such that they are continuously loading or unloading or moving through the Seaway/St. Lawrence/Gulf of St. Lawrence and into the Atlantic. Depending on which operator were selected, this could add C$1,500 to $4,500 per day to the overall cost, but the critical element is the ability to achieve a weekly schedule to meet the mainline carrier's vessel in Halifax. We were told by one of the operators that this type of operation is more suitable to shorter distances.

We also contacted several shipyards in Europe regarding the cost to build a new vessel. Two of them responded, and their estimates were very similar. However, we also have the benefit of public information regarding the new Oceanex vessel, *Oceanex Avalon*, a 1,004 TEU German-built newbuilding that cost Oceanex €$28 million ($55 million) as well as the 804 TEU Geest North Sea Line vessels at US$18 million each. For new vessels, we were given the worldwide price indications shown in Table 4.5 by Fincantieri, an Italian shipbuilder, CONOSHIP, a shipbuilder in the Netherlands, and one Canadian builder.

Table 4.5 Estimated New Feedership Costs

TEUs	Europe	Far East	Canada
450-500	US$14-$15 million	US$11 million	
600	US$17.5 million	US$14 million	US$29 million
750	US$20-$21 million	US$17 million	
804		US$18 million	

Note: For ice class add 3-5%

Existing trade agreements allow vessels to be imported duty-free into Canada from the US, Chile, Costa Rica and Israel. We attempted without success to contact ASENAV, a shipyard in Chile that builds "European quality" offshore supply boats. We also contacted a Canadian shipyard, which provided a ballpark estimate for a new 600 TEU ship.

Whether to buy new or used depends on a number of factors. Usually, a new operation will charter tonnage until the market is established. This gives the operator the flexibility to either reduce or increase capacity as market conditions warrant. Vessels used to be able to be chartered for six months with a six month renewal. In the present market, owners are asking for 24 months up front. Making TC Marine Safety modifications to a chartered vessel is very risky and expensive because these are "sunk" costs and cannot be recovered on the world market. Paying duty on a chartered vessel is also expensive and cannot be recovered in terms of building equity in a vessel. Building new, however, allows the cost of Canadianizing the vessel to be built into the total cost of the vessel, rather than having to be converted later as when chartering.

It therefore makes some sense to consider purchasing a new purpose-built vessel, if sufficient cargo commitments can be secured up front. This is a very risky strategy if the business outgrows the vessel capacity, because the market is so limited for Canadian-spec vessels.

In terms of purchasing a vessel, we consulted with two Canadian shipowners and the former chartering manager of an offshore supply boat company with experience in both new and second-hand vessels. If an owner or operator were to provide 30 to 40% equity in a new vessel, he or she is going to want to see a significant return on this equity. A C$20 million vessel with 100% financing over 12 years will actually cost less than the alternative, as shown in Table 4.6.

Table 4.6 Comparison of Equity vs. Loan Financing

	100% finance	30% equity + finance
Vessel cost	$20 million	$20 million
Term	12 years	20 years
Monthly payment/daily cost	$184,241/$6,141	$85,438/$2,847
Cost of finance	$6.5 million	$7.5 million
Opportunity cost based on 15% ROI		$114.5 million

Based on a 15% return on investment (ROI), the owner of the vessel will want to earn $114.5 million, or an average of $5.7 million over 20 years. Even if the owner settles for a 10% return, this will amount to $47 million, or $2.3 million per annum.

We were also informed that the timeframe to finance a vessel will depend upon where it is built, the quality of the steel used and potential shipyard financing. A vessel intended for use in Canadian waters, especially in winter ice conditions, will experience much harsher operating conditions than one used in Europe, the Far East or the Caribbean, where most feeders operate. This will affect both financing and the timeframe over which the vessel can be financed.

New vessels can usually be mortgaged for 12 to 15 years, whereas older tonnage can be financed over 7 to 10 years. At 5% over 12 years for a new vessel the sample vessels would pay the following daily mortgage and other costs (assuming 100% financing, 5% premium for ice class, 25% duty and 1.20 exchange rate).

Table 4.7 Daily Mortgage and New Ship Operating Costs

Size (TEU)	Mortgage[1]	Maintenance	Crew	Total daily cost
450	$5,549	$2,500	$3,700	$11,749
600	$7,062	$2,500	$3,700	$13,262
804[2]	$9,080	$2,500	$3,700	$15,280
1,004[3]	$17,616	$3,000	$4,000	$24,616

[1] Includes 5% ice class premium
[2] Based on *Geestdjik* type vessel
[3] Based on Oceanex *Avalon*, purchased for C$55 million, including duty

For a 450 TEU vessel, the cost to operate a new vessel is approximately 25% less than present market prices, albeit with considerably more risk to the investor, since this option commits the operator to a Canadian flag vessel of a pre-determined size from the outset, and does not allow for either smaller volumes at the beginning or larger ones within a few years.

Purchasing second-hand tonnage is also a possibility. In the case of the last two categories in Table 4.7, it is highly unlikely that an operator could duplicate the 804 and 1,004 TEU vessels, as they were purpose-built for the trades in which they operate. Existing vessels could probably be modified to carry a mix of 40 ft. and 53 ft. containers – at great expense, however.

Used vessels can be purchased over 7 to 10 years, depending on the age and condition of the vessel. They will usually cost more to maintain and banks may charge a higher interest rate. We have based these calculations on a four-year-old 396 TEU vessel, which we have assumed could be financed over 10 years at 6%; the others are based on 7 years' loan payment at 6% interest, and paying a 25% duty.

Table 4.8 Second-hand Vessel Ownership and Operating Costs

Vessel	Size (TEU)	Mortgage	Maintenance	Crew	Total
Shamrock	396	$6,011	$2,500	$3,700	$12,211
Range	636	$4,645	$3,000	$3,700	$10,525
Mill	772	$3,661	$3,000	$3,700	$10,361

Based on the data in Table 4.8, the lowest operating cost per TEU is going to be incurred with the 772 TEU M/V *Mill*. However, this vessel was built in 1979 and it would

be unlikely that an investor would purchase the vessel, modify it to meet Canadian flag standards and then pay 25% duty on it. Likewise, the 636 TEU M.V. *Range* was built in 1983 and the same rationale would likely apply. The M.V. *Shamrock* was built in 2000 and was sold at auction for US$11.5 million in late 2004. According to our sources, new vessels of the same size can be purchased for about the same price. Thus, it would appear to make more sense for purposes of this analysis to consider only new vessels, as Canadian flag requirements and ice class can be built into the design from the outset.

4.4 Economic Analysis

Using a new vessel of 450 TEUs, similar to the 431 TEU M.V. *Johan Bright* ex *Nordbay*, with which we have direct operating experience, and a new 804 TEU vessel with expandable cell guides, such as M.V. *Geestdjik*, we undertook an economic analysis using several scenarios. For the present analysis, we have ignored issues such as corporate taxation, concentrating instead on the proposed operating scenarios.

We have calculated ship costs based on the estimated newbuilding costs in section 4.3. The 450 TEU vessel would be very similar to the general description in Table 4.9.

Table 4.9 M.V. *Johan Bright* ex. *Nordbay*

Built	1980
TEU	431
Length	120.53 m
Beam	17.84 m
Draft	6.50 m
dwt	7,652
GRT	5,148
Fuel (propulsion)	14 tonnes IFO 380 per day
Fuel (generators)	1.2 tonnes MDO per day
Speed	13.5 kn

The second vessel, *Geestdijk*, is a new design built in Romania and the Netherlands for Geest North Sea Line of the Netherlands, for service across the English Channel. Its very innovative design features moveable cell guides allowing the carriage of 20, 40 and 45 ft. containers. The reported delivery price was US$18 million. A similar 1,004 TEU vessel, in that it can accommodate 20, 40 and 53 ft. trailers, was recently delivered to Oceanex for a price of €28 million. *We have made an assumption that a vessel such as* Geestjik *could be built to carry 20, 40 and 53 ft. containers for a similar price plus a premium for ice class*, although the price of the Oceanex vessel at €28 million suggests otherwise.[6] The vessel fits the general description in Table 4.10.

[6] We attempted to discuss the features of Geest North Sea Line vessels with Oceanex management to ascertain the difference between their new vessels, but Oceanex was not familiar with Geest Line.

Table 4.10 M.V. *Geestdijk*

Built	2005
TEU	804
Length	140.56 m
Beam	21.80 m
Draft	7.33 m
dwt	9,322
GRT	7,852
Fuel (propulsion)	18 tonnes IFO 380 (est)
Fuel (generators)	2 tonnes MDO (est)
Speed	18 kn

Our analysis examined several different scenarios. These scenarios were developed with the general parameters and assumptions listed in Table 4.11.

Table 4.11 Economic Analysis Assumptions

Assumptions
Two-vessel operation for weekly schedule
Lifts per week vary according to cargo mix
20'/40' or 40'/53' split
Ship cost @ $ per day; new vessels assume mortgage at 5% for 12 years
450 or 804 TEU cellular vessel
Halifax port cost @ either $200 straight time or $225 with overtime
Hamilton port cost @ $175
Fuel consumption @ either 14 or 18 tonnes per day x 5 days steaming; MDO @ 1.2 or 2 tonnes per day x 7 days
IFO cost @ $313 per tonne; MDO @ $576 per tonne based on prices 19/05/05
Halifax Pilotage @ $600 each vessel
Laurentian Pilotage Authority @ $14,088 for 431 TEU; $14,302 for 804 TEU vessel
Seaway tolls @ $5,467 for 431 TEU; $8,025 for 804 TEU vessel
Rates $450 per 20'; $720 per 40'; $1,000 per 53'
Trucking Montreal to Hamilton $500 per 20'; $600 per 40' or 53'

4.4.1 International Feeder Service

We are assuming a full vessel in both directions, which is unlikely to happen. Further sensitivity analysis could perhaps be done based on several sub-scenarios with varying load factors. Nevertheless, our analysis indicates the following weekly financial results for three season (non-winter) service:

a) Chartered 450 TEU vessel carrying 20/40 split of international cargo results in an operating loss of $165,076 x 2 = $330,152.

b) Chartered 450 TEU vessel carrying only international 40 ft. results in an operating loss of $98,076 x 2 = $196,052.

c) New 450 TEU vessel carrying 20 ft. and 40 ft. of international cargo results in an operating loss of $139,946 x 2 = $279,902.

d) New 450 TEU vessel carrying 100% 40 ft. international cargo results in an operating loss of $72,946 x 2 =$145,892.

e) Second-hand 772 TEU vessel carrying 20 ft. and 40 ft. of international cargo and working overtime rates at Halifax results in an operating loss of $70,593 x 2 = $141,186.

f) Second-hand 772 TEU vessel carrying 100% 40 ft. of international cargo and working overtime rates at Halifax results in an operating loss of $43,093 x 2 = $86,186.

g) New 804 TEU ship, carrying a split of 20 ft. and 40 ft. of international cargo and working overtime rates at Halifax will result in an operating loss of $63,151 x 2 = $126,302.

h) New 804 TEU vessel carrying 100% international 40 ft. and working overtime rates at Halifax results in an operating loss of $53,151 x 2 = $106,302.

All of the above scenarios would be positively affected by reductions in duty paid on the vessel, pilotage in the Gulf and St. Lawrence River, Seaway tolls, and stevedoring costs in Halifax and Hamilton. It does appear that the larger the vessel and the larger the percentage of 40 ft. international containers that are carried, the more viable the service is. However, none of these scenarios carrying 100% international feeder cargo is commercially viable.

4.4.2 Combined Domestic and International Service

A domestic intermodal service or one that combines domestic and international cargo may be more viable.

"Rack" rates for no pick-up and one delivery are listed in Table 4.12. However, based on a discussion with at least one major retailer known to be shipping with CN Intermodal, it is unlikely any shipper is paying rates this high.

Table 4.12 Halifax-Toronto Domestic Intermodal Rates

Equipment	Rate
48 ft. CN dry container	$1,190
48 ft. CN heated container	$1,308
48 ft. CN reefer container	$1,428
53 ft. CN dry container	$1,190
53 ft. CN heated container	$1,308
53 ft. CN reefer container	$1,428
53 ft. customer-owned unit	$2,057

Source: www.cn.ca "e-quote response", 2004.

Trucking rates are relatively consistent, and would appear to leave plenty of room between feeder costs and potential trucking rates. However, all trucking is warehouse-warehouse, and whether a shipper such as Loblaws switches to all-water service very much depends on frequency and service.

Table 4.13 Sample Trucking Rates To and From Halifax

Origin or Destination	Rate	
	Eastbound	Westbound
Montreal	$1,550 - $1,600	$1,150 - $1,600
Toronto	$1,900 - $2,100	$1,625 - $2,100

Sources: Various

We analysed several scenarios combining domestic and international cargo, assuming a rate of $1,000 per 53 ft. domestic container. As in section 4.4.1, we are assuming a full vessel in both directions, which is unlikely to happen.

a) Second-hand 450 TEU charter vessel combining international and domestic cargo based on approximate 60/40 split results in an operating loss of $86,201 x 2 = $172,492 per week.
b) New 450 TEU vessel combining international and domestic cargo based on 100/75 split results in an operating loss of $61,071 x 2 = $122,142 per week.
c) New 804 TEU vessel combining international and domestic service based on 200/175 split results in an operating loss of $13,151 x 2 = $26,302 per week.
d) New 804 TEU vessel with 325 x 53 ft. 100% domestic intermodal service results in an operating profit of $19,974 x 2 = $39,948 per week.

From the preceding analysis, it appears that a combination of domestic and international or a purely domestic service has the best potential profitability, assuming a suitable vessel could be chartered or built. Only one of these scenarios is commercially viable in the non-winter months.

4.5 Winter Operations

Besides the economics, one of the biggest obstacles to launching a Halifax-Hamilton feeder service is the challenge of providing service in winter. Every potential customer of the service said it was critical to solve this issue.

The St. Lawrence Seaway Management Corporation (SLSMC) has indicated that operation of the Seaway is technically feasible for 10 months of the year. For the purposes of this study, we assumed that it is feasible to operate between Montreal and Hamilton for nine months of the year, and that a solution to winter operations needs to be found from late December until late March to meet the requirements of modern-day supply chains.

4.5.1 Seasonality

At present the Seaway is open for nine months of the year. This is a major problem to overcome. From a marketing/customer retention perspective, not providing a service or solution is simply not prudent. Customers would be forced to find alternative routings for these months and the short sea service would have to recapture these customers every year. It is very likely that the winter service provider would demand a year-round commitment (or demand published tariff rates) from the short sea customers.

An alternative to simply dropping the customers would be to provide the on-carriage of containers to the Hamilton terminal using truck or rail and spread the cost over the year to keep a steady rate. To do this would require that the service absorb the additional

cost of calling a port outside the Seaway for three months per year plus the additional handling and inland haulage costs.

The additional incremental cost is estimated to be between $400 to $500 per 20 ft. container and $500 to $600 per 40 or 53 ft. container. These additional costs are offset only by the fuel and Seaway tariff savings associated with the Montreal-Hamilton portion of the voyage. As can be seen in Table 4.14, it is not feasible to add this kind of cost to the short sea rate and remain a viable alternative.

Year-round operation of the Seaway is still a long way away from taking place, and it would seem that, at present, only a seasonal short sea operation can be contemplated.

4.5.2 Seasonal Operations of the Seaway

The SLSMC has been working to extend the shipping season for quite some time. In addition to making physical improvements, it has implemented a number of procedures that allow operations in light to moderate ice conditions. Today the Seaway is open for a full nine months per year and the SLSMC is able to set fixed dates for the opening and closing of the Seaway.

Examples of some of the measures that have been taken to allow the Seaway to remain open for a full nine months include bubbling systems and procedures for scraping ice off the walls and for the evacuation of ice out of the lock prior to ship arrival.

Some key problem areas, such as ice building up in the area where the lock doors are recessed into the lock walls, require very close monitoring during these periods.

There are three other major obstacles to continuous operation:

- There are hydroelectric installations associated with most of the locks, using the difference in water elevation to produce electricity. These generating stations attempt to maintain as much water level difference as possible to maximize power production for winter months when power demand is highest. The somewhat lower water levels required for operation of the Seaway would limit their capacity to produce during these peak periods.

- As ships go through the Seaway system, ice is broken and pushed under or over adjoining ice, resulting in ice pans being stacked. If the ice gets stacked thick enough, it can block the seabay intakes that provide water to the engine cooling water heat exchangers. (Note: ship propulsion systems use diesel engine prime movers.)

- The requirement for yearly inspection, maintenance and repair would be difficult to meet. At present it takes one week to empty and inspect any particular lock. While this process could presumably be accelerated, the normal yearly maintenance is likely to require a minimum one-week shutdown, and since the locks are all part of the system, the locks would all have to be shut down at the same time. In addition to being a logistical nightmare, the requirement of having to service all of the locks on a 7-day a week, 24-hour a day, highly planned and prepared basis during the same week would add significant costs.

The locks were not designed for winter operation, and it is not expected that the Seaway will be open year round any time in the near future. The SLSMC is currently working on measures to extend the season to 10 months per year. This is already an ambitious undertaking.

4.5.3 Economics of Winter Operation

We examined several scenarios in relation to winter operations:
1) Operating as far as Montreal and trucking either to the terminal in Hamilton or directly to the consignee;
2) Operating as far as Sorel and trucking to Hamilton or the consignee;
3) Winter operation via Albany, NY, Oswego and Hamilton;
4) Shutting down the operation for the winter months.

Via Montreal

For our analysis of winter operations, we assumed that the vessel will take about the same time to reach Montreal in winter as it does to reach Hamilton during the balance of the year. Ice conditions in the Gulf of St. Lawrence, winter navigation requirements on the St. Lawrence River, and the inability to transit the Canso Canal will contribute to a lengthier than normal voyage. Nighttime navigation on the St. Lawrence in winter is also restricted.

This operation would therefore include stevedoring at the Port of Montreal and trucking to the final destination in the Hamilton/Toronto area. Stevedoring in Montreal would cost approximately $225 and trucking to Hamilton/Toronto would cost approximately $250-$400. Therefore, for Scenario 1, the additional cost to operate to Montreal in winter would include the Montreal stevedoring differential of $75 compared with Hamilton, the winter pilotage differential of, say, $67 per container, and the trucking cost. For the three months the Seaway is closed, this represents additional weekly costs as shown in Table 4.14.

Table 4.14 Cost of Winter Service via Montreal

Stevedoring differential	$75
Trucking	$300
Winter pilotage surcharge	$88
Less Seaway tolls	($21)
Total differential per container	**$442**

Via Sorel

Sorel is approximately 100 km downstream from Montreal. We estimate that stevedoring at Sorel is $100 less than Montreal. The cost to truck from Sorel to Hamilton/Toronto would be approximately $100 more per unit than from Montreal, so there are little savings to be had from this option.

Via Albany

Another possibility is feedering from Halifax to Albany, trucking from Albany to Oswego, and then shipping the unit across Lake Ontario on the proposed new ferry service.

Because the distance is much shorter, the operator could do a weekly turn between Halifax and Albany, meaning that only one vessel would be required. The cost to feeder via Albany is approximately as shown in Table 4.15.

Table 4.15 Service via Albany

Halifax lift	$200
Vessel costs[1]	$305
Hudson River pilotage	$5
Albany lift	$150
Harbour maintenance tax	$75
Albany-Oswego truck[2]	$311
Oswego-Hamilton ferry	$540
Total per container	**$1,586**

[1] not including pilotage in Hudson River
[2] 173 miles x US$1.50 per mile x 1.20 exchange rate

Thus, the cost differential is approximately $600 more than what the feeder rate is, so the operation would lose $187,500 per week x 12 weeks = $2,250,000. Unless a charter could be found, the payments on the second vessel would cost at least $15,820 x 7 days x 12 weeks = $189,840, and berthage in Halifax would cost about $300 per day = $25,200 over the period. Thus, overall, this option also results in an operating loss of $2.4 million, assuming the feeder operator absorbed the winter costs.

Shutdown

Like most of the laker fleet, there is the option of shutting down the operation in winter and laying up the vessel, or taking it off hire, or deploying it elsewhere. This scenario is unlikely to appeal to the marketplace because of present-day supply chain requirements.

Taking the vessel off hire is unlikely to be agreed to by the owners because of present-day market conditions. For three months, it would not be worthwhile repositioning the vessel to another location, and Canadian refit work is "usually" done in better weather. The exceptions have been Oceanex and CSL, which both do refits during the annual Christmas–New Year's holiday period and over the winter generally.

At minimum, shutting down the service would cost the equivalent of the two vessels' mortgage payments, i.e., $15,280 x 7 days x 12 weeks = $2,567,040. Berthage in Halifax would cost $50,400. Staff could also be laid off, but this is less than ideal in terms of continuity. Thus, the under Scenario 1, a purely domestic intermodal service, the service earns $628,800 per annum, assuming customers are able to truck their cargo between Halifax and Hamilton in winter and come back to use the service once spring arrives.

4.6 Other Ports of Call

Given that the Seaway is not available year round and that the rail alternative to/from Halifax is efficient from a cost/transit time perspective (despite frequent delays at times), other ports of call may add to the attractiveness of a short sea service.

Following is a quick review of the possibilities offered by a call to Sept-Îles as part of a short sea service in the Halifax-Hamilton corridor.

4.6.1 Port Rotation

The port rotation would consist of Halifax - Sept-Îles - Montreal - Hamilton - Montreal - Sept-Îles - Halifax while the seaway is open, and Halifax - Sept-Îles - Montreal - Sept-Îles - Halifax for the winter months when the Seaway is closed.

4.6.2 Schedule

The additional distance of some 95 km to call Sept-Îles on the way and the additional handling time for the extra lifts generated would require some additional speed but passing through the Strait of Canso in the summer months would more than offset this additional time. Nonetheless, we have assumed an additional ½ day steaming time to achieve the Sept-Îles port call. In Section 5.4 we determine a schedule that would allow the vessel to work in normal work periods and the impact that may have on both the Halifax and Hamilton operations.

4.6.3 Rates

Generally, the alternative is to truck this freight to and from Sept-Îles, with the exception of the freight to Labrador and Northern Quebec, most of which is currently routed by road from Baie Comeau to Fermont.

At a roughly 30% discount to compensate for the lack of speed and flexibility of short sea shipping, the projected rates would be as follows:

- Sept-Îles to Montreal: $660 per 40 ft. container
- Sept-Îles to Hamilton: $1,000 per 40 ft. container
- Sept-Îles to Halifax: $740 per 40 ft. container

The rates do not reflect some other reasons for using a short sea service to/from Sept-Îles. The assumed market share does take into account some of these reasons, which include, but are not limited to, wear and tear on roads, lack of time sensitivity of some cargoes (would not require as much of a rate discount), and ultimate origins/destinations of the freight.

One scenario examines the economics of incorporating a Sept-Îles port call on the 804 TEU vessel carrying domestic cargo. It assumes that 100 TEUs of the vessel are devoted to the Sept-Îles port call. Another scenario examines the same scenario but assumes 150 TEUs of cargo from Sept-Îles. A third scenario assumes 200 TEUs of Sept-Îles cargo.

4.7 Economics of Combined Service with Sept-Îles Port of Call

The Sept-Îles option carrying 50 containers or 100 TEUs of cargo has an operating profit of $31,279 x 2 = $62,558 per week.

It would appear that the optimal cargo mix is a combination of 50 containers to and from Sept-Îles and Halifax, and another 275 domestic containers carried between Halifax and Hamilton.

Winter is also problematic for this option and the same exercise would have to be undertaken to determine whether it makes sense to absorb additional costs, completely shut down operations, or just sail as far as Montreal.

4.8 Conclusion

It is evident that under existing circumstances the concept of a Halifax-Hamilton feeder service is a marginal proposition from a financial and supply chain standpoint. The only scenarios that have any appeal are a combined international/domestic service, or a purely domestic intermodal service. The Sept-Îles option also has some merit, but it also works as two standalone services – one from Sept-Îles to Montreal or Hamilton, and Sept-Îles to Halifax. The Halifax-Hamilton portion is not viable.

There are, however, some cost areas that could be addressed through government policy, which could change the economics of the service. Those cost areas that have an impact on the viability of the service, and that fall under policy and regulations include: pilotage in the Gulf and St. Lawrence River for Canadian flag vessels with Canadian crew, the requirement to pay 25% duty on foreign-built vessels, and Seaway tolls on container cargo. The cost of stevedoring in Halifax, particularly on domestic cargo, could perhaps be negotiated downward, but this is not a policy issue.

5. SUPPLY CHAIN LOGISTICS

The concept of supply chain management refers to "the management of a chain of supply as though it were a single entity".[7] It has taken on such importance that a recent survey of ABI/Inform, a database of global business publications, indicates more than five articles are written on the subject every day. With the shift of an estimated 30% of western manufacturing capacity to China in the past five years and the longer distances and lead times involved, transportation and the supply chain have taken on new importance.

There are several issues covered in this section:

a) Trends in Supply Chain Logistics as they relate to container shipping;
b) Basics of shipping by container;
c) Peculiarities of the eastern Canadian market, i.e., the impact of Shipping Conferences;
d) Schedule and service issues for the Halifax-Hamilton route.

All of the above factors are considered in relation to attracting domestic and international shippers, shipping lines and truckers to use a short sea shipping alternative.

5.1 Basics of Shipping by Container

The basics of container shipping are instructive with respect to the level of service that shipping lines currently provide to their customers.

In the 1970s and 80s, Cast Container Line was known for its Blue Box System, whereby it offered complete door-to-door service between most cities in North Europe and destinations in Quebec, Ontario and the Midwest.

Today, there are many different variables, all of which may need to be accommodated and/or provided by a short sea operator. A carrier may quote rates that include:

- Ocean freight;
- Origin terminal and ocean freight;
- Origin terminal, ocean freight and destination terminal: Terminal to Terminal;
- Origin inland charges, origin terminal, ocean freight and destination terminal: Door to Terminal;
- Origin inland charges, origin terminal, ocean freight, destination, terminal and delivery charges: Door-to-door.[8]

The correct marine terms are listed in Table 5.1.

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[7] Tim Laseter and Keith Oliver, "When Will Supply Chain Management Grow Up ", *Strategy + Business*, Issue 32, Fall 2003.
[8] *A Guide to International Transport* (Quebec: Les Publications du Quebec, 1993).

Table 5.1 Marine Terms

Charges	Door/ Door	Terminal/ Terminal	Door/ Terminal	Terminal/ Door
Origin Inland	included		included	
Origin Terminal	included	included	included	included
Ocean Freight	included	included	included	included
Destination Terminal	included	included	included	included
Destination Inland	included			included

In the case of Halifax-based carriers, the terminal could be the container terminal in Halifax or the inland terminal in Montreal, Toronto, Chicago or elsewhere. One Halifax carrier informed us that about in about 60% of its moves, the shipper arranges (and pays) for cartage while it arranges the other 40%. Another very large carrier said it now actually prefers to quote port to port, in which case the shipper does the stuffing and destuffing and arranges all inland transportation to and from the terminal (in this case, the terminal can be located inland).

5.2 Trends in Supply Chain Logistics

Liner shipping, which is basically scheduled shipping, has undergone enormous change in the past three decades. These changes relate to the cost structure of the lines, their relative size, the quality of non-conference shipping lines, and the operating relationships between various shipping lines, which are otherwise ardent competitors. [9]

5.2.1 Cost Structure of Shipping Lines

Due to the rise of intermodalism, the cost structure of the liner shipping industry has changed radically in the past 20 years or so, especially in the North American trades. Ship operations now only account for about 20% of total costs, with port costs, inland rail (or truck) costs and back office operations accounting for much of the rest. If the use of a feeder service between Halifax and Hamilton results in a reduction in inland costs, which do not have to be passed on to the customer, shipping lines are going to view this with interest.

5.2.2 Alliances and Slot Charters

In order to serve the needs of multinational and transnational corporations, which are increasingly demanding global logistics solutions, shipping lines have had to extend their global reach. A relatively inexpensive way for them to do so has been to develop operating alliances with hitherto cutthroat competitors. With several shipping lines basically selling the same "ship", market differentiation is achieved by selling a higher level of service or different pricing.

One such alliance is the Grand Alliance, which calls at Halifax with two services. Its members include: Hapag Lloyd (Germany), P&O Nedlloyd (to be taken over by Maersk Line as of February 2006), NYK Line (Japan), OOCL (Hong Kong) and MISC (Malaysia). To further complicate matters, Atlantic Container Line (ACL) charters space from Hapag

[9] Trevor Heaver, "The *Shipping Conferences Exemption Act*: Review and Suggestions of Positions Appropriate for the Panel", Research for the *Canada Transportation Act* Review, April 2001.

Lloyd on one of the services, as does Hapag from ACL on its service to and from Liverpool. The Canada Maritime service between North Europe and Montreal is a slot charter, whereby several shipping lines charter space from the two vessel providers, CP Ships and OOCL.

The relevance to this study is that fewer and fewer carriers or alliances control larger and larger blocs of cargo, and the number of potential customers of a feeder service is reduced. However, within alliances, some members may prefer to feeder cargo vs. moving it inland by rail, to either save money or differentiate themselves from their other partners.

5.2.3 Business Strategy of Shipping Lines

Shipping lines have recently focused less on being "shipping lines" than as an integral part of their clients' supply chains, offering full door-to-door service. Some shipping lines, such as Maersk Sealand, NYK Line and P&O Nedlloyd have established logistics divisions and so-called 3PL services to provide one-stop shopping for global shippers. They also tend to direct their clients' business to their own services. For instance, if Maersk Sealand had sufficient volume to justify its own in-house feeder, it would quickly abandon a common user feeder service.

5.2.4 Logistics Needs of Shippers

As shippers have become more sophisticated, and as more industrial production has moved from the western economies to China, India and South East Asia, freight rates have become less important compared to service, reliability and dependability. Shippers are seeking transportation partners rather than mere providers.

Massive increases in the amount of cargo originating in the Far East, particularly China – the so-called "China effect" – are having an enormous impact on supply chain logistics as they relate to import cargo, and shipments via the west coast of both Canada and the US, in particular, and increasingly the east coast via all-water services. New routes such as another all-water routing via the Suez Canal may also be a result of ongoing issues of congestion on the west coast. Likewise, seasonality is not as much of an issue as it once was. Cargo moves all year round because capacity constraints, particularly on the west coast and amongst North American railways, do not allow for seasonal bursts of shipping activity.

The result has been a shift away from a focus on speedy transit times to more of a priority placed on cargo integrity, timeliness (not necessarily speed) and reliability. This phenomenon will tend to favour a cost-effective, reliable, short sea service. An illustration of this is the all-water round-the-world service via the Suez Canal recently announced by China Shipping, which may be a portent of future developments and may in turn have a positive impact on Halifax volumes.

5.2.5 Routing of Cargo

Routing of cargo is critical in terms of short sea shipping between Halifax and Hamilton. Whereas shipping lines themselves once controlled the routing of cargo, today it is increasingly in the hands of both shippers and freight forwarders. Both of them choose carriers and ports of discharge based on their collective needs. If the shipper does not

specify the port of discharge, the shipping line will do so based on rate and service requirements (i.e., transit times).

In the case of shipping lines with services to both Halifax and Montreal, a number of criteria will come into play, such as vessel capacity, rates vs. cost, overall transit times, and port of origin. Services to Montreal tend to originate in North Europe and the Mediterranean, and serve Quebec, Ontario and the Midwest. North Atlantic and Mediterranean services to Halifax tend to be operated in a pendulum, connecting more than one continent, and serve other markets besides those mentioned above. While vessels operating to Montreal have been getting larger and larger, they tend not to be as large as those sailing to Halifax, which somewhat (but not totally) offsets the cost differential between the two routes.

5.3 Peculiarities of the Eastern Canadian Container Shipping Market

The basic principle that the Conferences established at the advent of containerization was that rates would be equalized between Montreal and Halifax and that the Halifax-based lines would absorb the cost of inland transportation between Halifax and either Montreal or Toronto. The reasoning was that larger vessels could operate to Halifax with better economies of scale and that the extra transit time to Montreal (10 vs. 7 days) also represented a cost disadvantage to the Montreal carriers. Another peculiarity of the Conference system is that cargo discharged at Halifax does not necessarily pay a lower rate than cargo destined for Montreal or Toronto, especially cargo that travels a longer distance (e.g., from India to Canada).

The Canadian market is still split between Conference and non-Conference services on the key North Atlantic and Mediterranean trade routes. However, the number of shipping lines that are members of the conference is far fewer than even a few years ago. Four Conferences – Canada-United Kingdom, Canadian North Atlantic Westbound, Canadian Continental Eastbound, and Continental Canadian Westbound Freight – have only four members: Canada Maritime, The Cast Group, Hapag Lloyd and Orient Overseas Container Line (OOCL). In the case of Hapag Lloyd, it is competing with non-Conference carriers shipping cargo on the same vessels.

Thus, insofar as a Halifax-Hamilton feeder is concerned, if international cargo is carried, the shipping line might control the routing or might not, and if it moved via feeder, it would almost certainly absorb the cost of doing so, the same as if it moved by rail. To this point, it would be highly improbable for an individual shipper to arrange its own inland transportation if the final destination was, say, Toronto, since the railway quotes volume discounts and the sum total of a given shipping line's volume would be many times greater than any individual shipper (even a big one).

5.4 Schedule and Service Issues

Based on our experience in the feeder business, the key to success is to have the short sea service built around the schedule of the mother ship arrival in Halifax, and for cargo to be transferred as quickly as possible to the feeder. The schedules of Halifax vessels are as shown in Table 5.2.

Table 5.2 Schedules of "Mother Ship" Calls at Port of Halifax

Shipping Line	Service	
	Eastbound	**Westbound**
Zim	Saturday	Friday
Grand Alliance AEX	Friday	Wednesday
Grand Alliance PAX	Saturday	Saturday
ACL	Monday	Sunday
China Shipping		Thursday

This service will, in effect, need to compete with at least twice daily train service. It may be that the feeder is built around one particular service or consortium, such as the Grand Alliance (Hapag Lloyd, P&O Nedlloyd, OOCL, NYK Line), which has four ship calls, including two import vessels per week at one of the Halifax container terminals. In other words, a successful feeder operation needs a base load of cargo.

The technical analysis has determined that a domestic component needs to be incorporated into the service to have any chance of viability. With a two-vessel service, the ideal schedule is as shown in Figure 5.1.

Figure 5.1 Recommended Feeder Schedule

Vessel 1		
	Load/Discharge Halifax	Monday
	At sea	Tuesday-Sunday
	Discharge/Load Hamilton	Monday
Vessel 2		
	Discharge/Load Hamilton	Monday
	At sea	Tuesday-Sunday
	Load/Discharge Halifax	Monday

This schedule would appear to accommodate as many lines as possible and avoids having to pay overtime rates for stevedoring in Halifax.

Since few truckers or retailers would respond to our enquiries regarding domestic requirements, we were unable to determine with any certainty their preferred day of loading in Hamilton. However, an end or beginning of week loading would deliver cargo to Halifax for the end of the week or beginning of the following week.

5.5 Winter Service

The issue of winter service was discussed in the technical analysis. Current supply chain requirements and worldwide cargo movements mean that winter service is critical or the service will not succeed.

6. POLICY IMPLICATIONS

Fundamental to the success of the venture under consideration in this study is the policy and regulatory environment in which the initiative will be constrained to operate. Government policies, and the programs and activities that flow from them, not only have significant implications for cost, but can also have a critical influence on efficiency, reliability and timeliness. The precarious nature of the viability of this initiative highlights the need for government policies to be as streamlined and appropriate as possible if prospects for its success are to be realized.

In this regard, the formulation of government policy, and the delivery activities (comprising both regulation and service provision) that flow from it, may be viewed as falling into three broad categories: economic performance, safety (including security) and environmental protection.

Economic regulatory policy includes provision of an appropriate fiscal environment, for example, optimum forms and levels of corporate tax, fuel excise tax, etc. It also includes import duty considerations, the most important of which in the Canadian context is the 25% payment required on virtually all foreign-built ships in order to operate in the Canadian coasting trade. Economic regulatory policy may also be considered to include protectionist measures such as the control of access to cabotage activities (a measure largely independent of duty considerations). Again, economic policy considerations extend to the terms and conditions under which services and facilities are provided, principally to realize economic benefits, such as dredging, icebreaking, canals, and of course port facilities. A final key consideration is the manner and extent to which governments (since other levels are also involved here) ensure the provision of adequate and efficient infrastructure to support short sea shipping operations.

Safety and environmental policies are directed principally at the prevention of, and response to, shipping accidents and incidents, and again they may take the form of either regulation or services. The regulation element is directed primarily at prevention, and is focused mainly on the construction, equipment and operation of the ship, and on the numbers and competencies of the crew. Such regulation is predominantly concerned with avoidance of a dangerous situation arising on board a ship (such as collision, grounding, sinking, fire, etc.). It may also, however, be directed at discouraging or constraining a ship that, while not itself in any danger, has the potential to damage the environment, for example, through (possibly intentional) discharge of pollutants, ballast water contamination, or use of environmentally damaging anti-fouling paint.

More specifically with regard to security, regulations may be directed at ensuring that practices and procedures are followed that minimize the risk of criminal acts such as terrorism, smuggling, piracy or illegal immigration.

Government also has a responsibility to ensure the provision of safety and environmental services that may have either accident prevention or response objectives. Prevention services include pilotage, navigation aids, traffic management schemes, communications services, etc., whereas the principal response services are search and rescue (SAR) and oil or hazardous or noxious substances (HNS) spill response arrangements. With the exception of SAR, there is an expectation that ships will normally contribute to some or all of the cost of provision of these services.

Clearly, the manner in which all the above policy considerations are applied to the short sea shipping concept under consideration will have important implications for its viability. At issue is whether, and if so to what degree, there is any significant flexibility in the way these policies and programs are applied sufficient to allow adjustments that can in turn lead to cost savings and/or improved efficiencies.

6.1 Background

In reviewing the various policy and program regimes that apply to shipping engaged on the route under consideration, it is perhaps helpful to first reiterate the policy objectives behind this initiative.

As made clear from various sources, including its website and pronouncements at such fora as the National Marine Conference on November 4, 2004, Transport Canada is exploring possible opportunities to promote short sea shipping as a means to help alleviate congestion, strengthen intermodal linkages and facilitate trade, improve utilization of waterway capacity, and reduce greenhouse gas emissions. A further declared policy driver is to meet future demands arising from economic expansion, increased trade, population growth and urbanization. Thus, the principal reasons for expanded interest in exploring the potential for short sea shipping may be distilled to three important sets of benefits. First, increased use of marine transportation is viewed as having a less negative impact on the environment; second, it is seen as having the potential to relieve the increasing problem of congestion on land-based transportation corridors; and third, it is regarded as offering potential to stimulate trade in its own right. At issue, therefore, is the degree to which these three benefits may be realized along the route under study here.

Ultimately, however, if it is seen as desirable to encourage expanded use of the marine mode as an alternative to land transportation, then the policies that government adopts must reflect and respond to that goal. In other words, if the current policy framework is intended to stimulate interest in marine options, then that framework must be subjected to careful examination to ensure that only those costs and obligations that are absolutely necessary and justified are borne by the marine mode.

More particularly in relation to environmental considerations, if the correct commercial and investment decisions are to be made, ways must be found to ensure that all negative environmental impacts attributed to each mode are fully reflected in real costs to be borne by that mode.

6.2 Competition

Again, before embarking on any discussion of the impact of government policy on the proposed shipping service, it is useful to examine the nature of the competitive environment in which such a service would operate, and against which the concept should be compared.

The natural inclination is to view the competition as limited to land-based alternatives, namely road and rail. This does not, however, recognize the true nature of the proposed service and where it fits in the wider transportation scenario. All the important export/import cargoes passing through Halifax involve an international marine transportation leg, performed by foreign flag vessels. This circumstance gives rise to the

possibility that the costs of a domestic feeder service could exceed the cost of moving cargo directly between international and inland (Great Lakes) origins/destinations in a foreign flag bottom, an option that avoids the associated additional costs, including registration, crewing, duty and fiscal elements. In other words, whether a feeder service between Halifax and Hamilton is ultimately concluded to be attractive in relation to rail or trucking alternatives, it has to be recognized that such a service could itself be displaced by an international (foreign flag) service operating directly into the Great Lakes from, say, Europe.

The point to be made is that the imposition of domestic requirements and obligations on what is essentially the continuation of an international transportation service has an important impact on the competitiveness and viability of the service. It is in this context that the policy environment needs to be evaluated.

6.3 Economic Policy Considerations

6.3.1 Import Duty

As is well known in Canadian marine policy circles, any Canadian ship operator that wishes to import a foreign-built vessel for engagement in the coasting trade of Canada must (with some limited exceptions) first pay an import duty fee of 25% of the fair market value of that vessel. As is also well known, this duty requirement has come under repeated criticism from a variety sources, both nationally and internationally. Among the most important of these instances of criticism was the 2001 review of the *Canada Transportation Act*, in which a clear recommendation was made to remove this duty.[10] Some four years later the government has yet to respond to this recommendation.

As mentioned briefly in Chapter 8 of *Vision and Balance*, this duty seriously affects the prospects of providing a viable alternative to other modes. Additionally, and as also explained in Section 3 of this report, it presents significant impediments to operators who may wish to develop a market for short sea shipping over time using a series of vessels of increasing size. Such a strategy would mean that the 25% addition to the value of the vessel would be lost at each shift in vessel size. Again, it also places the domestic service at a serious competitive disadvantage with direct international options using foreign flag vessels.

In an industry where ships are, in effect, commodities, would-be Canadian operators lose out in several important ways. Not only is it impossible to recover the duty in world markets, it is also difficult to obtain bank financing for vessels that are not economically viable in international operations. Finally, recognizing that any vessel engaged to provide this service cannot, at least at the present time, expect to operate for more than about nine months of the year because of the seasonality constraints of the Seaway, its potential engagement elsewhere for the three winter months, difficult enough in any circumstances, would be rendered yet more problematic by the need to recover, in any charter arrangements, the additional cost associated with the duty payment.

If the 25% duty and additional requirements relating to TC Marine Safety regulations are stripped out of the analysis described in Section 3, short sea shipping between Halifax

[10] *Vision and Balance*, Canada Transportation Act Review, Ottawa, June 2001, p. 139.

and Hamilton appears slightly more viable. To reiterate, that analysis indicated the mortgage costs for new duty-paid vessels as shown in Table 6.1

Table 6.1 Impact of Daily Mortgage and New Ship Operating Costs

Size (TEU)	Mortgage[1]	Maintenance	Crew	Total cost
450	$5,549	$2,500	$3,700	$11,749
600	$7,062	$2,500	$3,700	$13,262
804[2]	$9,080	$2,500	$3,700	$15,280

[1] Includes 5% ice class premium
[2] Based on *Geestdjik* type vessel

If recalculated without the duty, these costs become those listed in Table 6.2.

Table 6.2 Daily Mortgage and New Ship Operating Costs (no duty)

Size (TEU)	Mortgage[1]	Maintenance	Crew	Total cost
450	$4,272	$2,500	$3,700	$10,922.00
600	$5,438	$2,500	$3,700	$12,238.00
804[2]	$6,992	$2,500	$3,700	$13,192.00

[1] Includes 5% ice class premium
[2] Based on *Geestdjik* type vessel

Operating costs per vessel are therefore reduced by the figures shown in Table 6.3.

Table 6.3 Reduction of Operating Costs with Removal of Duty

Daily	Weekly	Yearly
$827	$5,789	$301,855
$1,024	$7,168	$373,760
$2,088	$14,616	$762,120

The bottom line is that the 25% duty not only adds cost to any potential domestic short sea service, but also limits the availability and commercial flexibility of ships suitable for such services. It is worth noting that no other developed maritime state applies such a duty; in fact, Canada has been criticized by its colleagues in the Organisation for Economic Co-operation and Development (OECD) for maintaining this protectionist mechanism for its shipbuilders.

Since the arguments in support of removal of this duty are comprehensively articulated elsewhere, it is not regarded as either useful or necessary to reiterate them further here. Suffice it to say that until or unless this issue is formally addressed and resolved, the prospects for short sea shipping in Canada – not just for the service under study but wherever it is being considered across the country – will likely be seriously weakened.

6.3.2 Coasting Trade Access

Recognizing the serious difficulties faced by a potential provider of the service in using owned tonnage, either new or used, some examination of the charter option is no doubt merited. Such a charter would almost certainly necessitate use of a foreign-built, foreign flag vessel brought in under the coasting trade waiver process. This process would require a review by the Canadian Transportation Agency to establish that no suitable Canadian registered vessel was available for the proposed service. While this would not be expected to be problematic, since there are currently very few potentially suitable

Canadian flag vessels, it may be that the charter rate to render the service viable (accepting the complexities of the three month hiatus) would necessitate a charter period in excess of the current temporary entry time limits. This aspect would need to be examined.

Accepting a reasonable expectation that the application would be approved, the use of the vessel would require the payment of a fee calculated at 1/120 of 25% of the fair market value of the vessel for each month or part of a month the vessel would be engaged in the service. Such a payment again has a significant negative impact on the viability of the service, and the rationale for such a charge is as questionable as the 25% duty payment. Nevertheless, the opportunity to terminate the charter in order to adjust the size of the vessel or to manage costs over the winter months provides more flexibility to a potential service provider than would be available were the ship to be bought and imported.

6.4 Economic Service Considerations

It is difficult to argue for special terms and benefits to be provided to short sea shipping operations for the provision of any particular economic service. If short sea shipping merits some beneficial treatment in the services it receives, then no doubt other similar shipping operations deserve equivalent treatment. Thus no persuasive case can be made for short sea shipping to receive, say, reduced charges for its port services or for use of the Seaway. If there is merit in any adjustment, the case would need to be made in a wider policy context.

In this respect the *Canada Marine Act* Review, released in 2003, recommended a number of initiatives, principally directed at the major ports (Canada Port Authorities), aimed at improving their competitiveness and enhancing their financial flexibility. In June 2005 the Minister of Transport introduced Bill C-16, an Act to amend the *Canada Marine Act* and other Acts. A central proposal in the Bill is to provide Canada Port Authorities with limited access to federal contribution programs for key infrastructure. These amendments are intended to provide Canada Port Authorities with access to federal contribution programs for key infrastructure improvements. It is also proposed that the Minister be provided, under certain conditions, with authority to increase a port's borrowing limits without Government-in-Council approval. Finally, the Minister intends to enhance the safety and efficiency of Canadian waterways by reforming the enforcement regime. These initiatives, while undoubtedly beneficial to the ports themselves, may only be expected to realize comparatively modest, indirect benefits for short sea shipping.

In relation to the Seaway, it is noteworthy that the Review made the important observation that "the future of the Seaway requires the leadership of the Government of Canada and the commitment of all stakeholders, including the provinces, to determine whether the Seaway should continue to be a necessary part of our nation's future transportation network".[11] The federal government makes limited mention of the Seaway in its recent proposed amendments to the *Canada Marine Act*. It is clear that the viability or otherwise of container services into the Great Lakes, such as is under consideration in this study, is a key element in any determination of the future of this important waterway.

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[11] Transport Canada Publication TP 14107B, Canada Marine Act Review, Appendix C, Observation No. 3.

Dredging and icebreaking were not substantively addressed by the *Canada Marine Act* Review since they fall under the responsibility of the Minister of Fisheries and Oceans. These considerations are, however, receiving attention through more recent review processes, and are discussed in Section 6.3 in relation to cost recovery for marine services. Suffice it to say that this project cannot identify well-justified, cost-beneficial adjustments in relation to dredging or icebreaking services.

6.5 Safety and Environmental Policy Considerations

6.5.1 Prevention Regulation

Transport Canada has in the past frequently reaffirmed its position that the regulatory requirements (e.g., in relation to structural modifications, equipment enhancement, etc.) imposed on foreign-built ships being imported into Canada are both reasonable and necessary. Despite this, there remains a large body of opinion among Canadian ship operators that believes that significant expenditures are being unnecessarily incurred in having to make unnecessary and expensive modifications to foreign-built ships in order to meet Canadian registry requirements – requirements that are in excess of international convention obligations.

It is beyond the scope of this study to intensively examine this apparent contradiction. However, it is worth noting that if there is any validity in the argument that Transport Canada regulations impose additional costs upon an operation in order to meet domestic requirements, these costs cannot then be recovered in world markets. On the other hand, where internationally it has been seen as beneficial to encourage national registration, for example in the UK, significant efforts have been invested (principally by the UK Marine and Coast Guard Agency, which is responsible for marine safety regulation) in making registration requirements and procedures more user-friendly and in minimizing costs without sacrificing safety standards. It is suggested that if Canada wishes to enhance the competitiveness of its domestic shipping operations, particularly in relation to potential international alternatives, then steps need to be taken to examine whether similar initiatives by the Marine Safety Directorate of Transport Canada could remove further cost impediments to the importation of foreign-built ships to meet Canada's marine transportation needs. Again it may be possible to achieve further cost efficiencies by expanded use of "delegation to class".

In relation to other prevention regulation considerations, and as mentioned in Section 6, controls are also imposed on commercial shipping with regard to such matters as ballast water management, overboard discharges, anti-fouling paint, etc. No modifications to these controls are seen as likely to offer significant savings potential. It would seem clear that, if safety or environmental considerations demand a regulatory provision applying to shipping in general, that provision is equally applicable to short sea shipping.

That said, and recognizing the important environmental considerations behind this project, it would seem highly desirable that a number of environmentally oriented initiatives be given special emphasis. These include, for example, the Full Cost Accounting Study that is currently examining how environmental benefits that are offered by the marine mode might best be factored into transportation costing. Similarly, there is a need to ensure that initiatives directed at developing an emissions credit system for large industrial emitters of greenhouse gases extend to transportation choices, so that

the environmental benefits exhibited by the marine mode may be translated into enhanced demand. In addition, development of a Green Ship Award Program similar to that currently existing in the US also needs to be given some serious consideration, as does the need to ensure that the environmental contribution of marine transportation is properly recognized and accommodated under the government's Freight Efficiency and Technology Initiative. Pursuit of these various environmentally oriented projects offers important potential to contribute to the viability of short sea shipping services such as the one under study here.

6.5.2 Prevention Services

An important consideration influencing the viability of the service under study is the cost of services provided to shipping for the purpose of preventing safety-related or environmentally damaging accidents or incidents.

Pilotage

Perhaps the most significant prevention service is pilotage, which has had a difficult track record ever since the *Pilotage Act* entered into force in 1972. In the past decade the matter of pilotage has come under intense scrutiny, including a study by the Standing Committee on Transport, leading to a proposal in 1995 that the present pilotage regime be replaced. While this proposal was not acted upon, a provision was included in the *Canada Marine Act* calling for the Minister to conduct an inquiry into various aspects of the Canadian pilotage system. In November 1999 the Minister submitted a report to Parliament conveying the results of a review conducted by the Canadian Transportation Agency (CTA). This report contained the 21 recommendations made by the CTA in its review, together with government responses to those recommendations, almost all of which were supported by the Minister.

In 2003 the *Canada Marine Act* Review contained an observation that, in light of that endorsement, it was "now up to the Government of Canada to ensure expeditious implementation of the outstanding recommendations in the interests of a more competitive marine transportation industry, helping to fulfill the goals of the CMA and the National Transportation Policy".[12]

It would appear that certain modest advances have been made in implementing the CTA recommendations, particularly in relation to the development and implementation of a pilotage risk management methodology that has, in turn, led to certain minor adjustments to the respective compulsory pilotage regimes of the four authorities. There is little in the adjustments made to date, however, or anticipated any time soon, to suggest much in the way of substantive relaxation in the requirements for compulsory pilotage or in the regimes governing the exemption or certification processes, and hence reduction in the cost of pilotage services.

It is not for this study to embark on an intensive re-examination of the complex and controversial issues surrounding pilotage. However a couple of quite general observations are offered that we believe merit policy consideration.

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[12] Transport Canada Publication TP 14107B, Canada Marine Act Review, Appendix C, Observation No. 10.

- The regulatory regime existing in the Great Lakes Pilotage Authority (GLPA) area of jurisdiction provides a means by which both masters and mates may qualify for exemption so long as they each meet certain prescribed standards. Such exemption provisions (allowing masters and mates to achieve exemption without sitting an exam) do not, however, exist in the Laurentian Pilotage Authority (LPA) area of jurisdiction. If the safety record of exempted shipping in the GLPA can be taken as demonstrating that the exemption provisions are both appropriate and sustainable, and this would appear to be the case, then there is a clearly a need to establish what (if any) special circumstances exist in the LPA area of jurisdiction that preclude an equivalent (albeit not necessarily identical) exemption process. Furthermore, it begs the question as to whether the public interest is best served by (still) having two separate pilotage administrations (as well as a third US pilotage administration) for this single continuous waterway.

- More fundamentally, public choice theory, a well established tenet of modern public administration, argues that the public interest is generally not well served when those who have an influence in deciding what constitutes the best interests of the public also have a related substantive personal interest in the outcome. The governance structures called for by the *Pilotage Act* place marine pilots in this situation, and in this respect it may be reasonably argued that the governance model prescribed by the Act is flawed, and as proposed by the Senate Committee on Transportation (SCOT), needs to be replaced by a new pilotage governance regime that more effectively separates pilotage policy formulation from pilotage service delivery.

Of course, recognizing that a voyage between Les Escoumins and Lake Ontario (the extent of non-port related compulsory waters along the route under examination) is likely to involve a passage of some 50 hours, it is clear that a ship cannot navigate the entire voyage without pilotage support unless there is on board both an exempted ship's master and an exempted first mate. However, were such an eventuality to be made possible, significant savings could be achieved by an exempted Canadian flagged and crewed vessel. Taking the 804 TEU vessel as an example, avoidance of pilotage costs would result in savings of $14,902 per week, or $774,904 per annum.

Marine services

Another contentious issue has been the introduction of charges for the provision of marine services – principally navigation aids, but also icebreaking. As with pilotage, the marine transportation industry has expressed its considerable discomfort with this charge. In addition, the *Canada Marine Act* Review endorsed the industry position in its observations. There can be little doubt that the imposition of these Coast Guard user charges on a particularly hard-pressed industry for services that, up to the time of introduction, had been provided free of charge has constituted a particularly painful circumstance, and thus the reaction of industry to this imposition is not surprising.

Transport Canada and Fisheries and Oceans Canada have initiated a Marine Navigation Services study whose objective is to examine the present arrangements for the provision of marine services, and in particular to review the policy rationale for the application of user charges. Phase 1, the initial assessment phase describing how services are currently provided, has been completed, and the results of Phase 2 are now awaited. No

utility is seen in endeavouring, in this study on short sea shipping, to duplicate the efforts of this exercise.

Suffice it to say, however, that while the industry may be pressing hard for relief from this recently imposed fee, and while it could be concluded that some relief may be justified, the best form of that relief may not necessarily be afforded by full removal of the service fees, which, incidentally, amount to an estimated $2,737 per week or $142,324 per annum for an 804 TEU vessel (assuming 12 month operation). It may be argued instead that some level of payment for service has a sound policy rationale in that it provides an effective downward pressure on demand. It is also worth noting that the practice of charging for such services is quite widely accepted internationally (although notably not in the US, at least not in the same way).

That said, and accepting that it may be difficult to argue for elimination or possibly even reduction in service fees, it is reasonable to consider whether there may be more sophisticated mechanisms than relief from service charges to assist a hard-pressed industry. For example, fiscal measures that cater to the unique environment of national and international shipping (and that recognize that the two markets are in many ways indivisible) and that may reflect such concepts as tonnage tax and income tax relief for seafarers serving in ships engaged in international trade, have been quite widely applied in other developed maritime states and should be carefully examined for possible application here.

Also for consideration is whether the government has been sufficiently ambitious in its examination of alternative service delivery mechanisms. The recent transfer of the Canadian Coast Guard (CCG) to Special Operating Agency status is clearly a step in the right direction. However, for consideration is whether a larger step might usefully have been taken. There are excellent examples of effective arm's-length marine agencies, for example in Australia, Sweden and the United Kingdom. Here in Canada, Navcan and the SLSMC are also examples where more business-like governance models have been deemed a success. In this respect the model chosen for the CCG may be viewed as somewhat modest in its ambitions and in the benefits it is likely to bring. Of course, it is recognized that the emerging, yet still largely undefined, role of the Coast Guard in security oversight and enforcement complicates this governance debate.

With respect to safety and environmental response services, search and rescue is provided free to shipping, and therefore has no influence on the costs of providing a short sea shipping service. Again, while environmental response constraints are directed principally at hydrocarbon and HNS carriage, where the policy is that the polluter pays, there appears to be little substantive opportunity for cost savings in this sector.

6.6 Summary

It may be concluded from the review of government policies and programs that, in general, real benefits in cost or efficiency to the short sea shipping project under consideration will likely only be achieved if government is willing to revisit some long-standing and quite sensitive policy positions. Safety and environmental protection compromises are clearly non-negotiable, and thus, if opportunities for savings are to be realized, more fundamental options need to be examined. Among these is consideration of alternative fiscal policies, governance adjustments, and/or alternative, more business-sensitive forms of service delivery.

The policy adjustment offering the biggest single return in relation to the viability of this service is removal of the 25% duty requirement. As outlined in Section 6.3.1, this issue has been carefully examined on numerous occasions without identifying substantive benefits for the ship operating industry, or indeed even for the Canadian shipbuilding industry. In this respect it appears to be a policy anachronism in urgent need of adjustment. While such an adjustment needs to be undertaken with considerable care in order not to disadvantage those who have over time adjusted to the present artificial regime, it nevertheless needs to be pursued. In this respect, if there is a single message emanating from this policy review, it is that this issue needs urgent attention if the concept of short sea shipping is to take hold in Canada.

7. CONCLUSIONS

Based on this market study, a Halifax-Hamilton short sea feeder service is not commercially viable under the present circumstances. Several factors mitigate against its viability.

From a marketing standpoint, there is some interest in the service as an alternative to CN. However, those shipping lines that are most interested in the service currently pay the lowest rates to CN. This suggests that CN's rates are actually quite reasonable and that short sea shipping is not viable where it runs parallel to existing rail service. From this perspective, the Sept-Îles example is instructive. Road and rail options are less than ideal and thus there appears to be some potential to develop a short sea alternative.

Interested retailers are only interested in using the service for their import cargo, as a weekly service is not sufficient for domestic cargo. As one of them commented, "why pay the same rate for weekly service as I can get for daily, or at least five times per week service?" Nonetheless, from a public policy standpoint, it may be more palatable to direct efforts toward domestic freight rather than international freight, which already moves intermodally and in a relatively efficient manner. In this context, it may make more sense to focus on areas where congestion is most prevalent, such as Highway 401 and across the Great Lakes.

From a technical and financial standpoint, there are many obstacles to overcome. They include vessel costs, pilotage costs, Seaway tolls, and winter service. The issue of Halifax port stevedoring costs has also been raised. The 25% duty paid on foreign-built vessels is a serious deterrent to the establishment of short sea shipping from a number of perspectives. It is a barrier to entry, it limits a vessel's marketability outside the country, it is an obstacle to obtaining financing, and it adds a layer of cost to the overall structure. Pilotage in the St. Lawrence River is very expensive and an exemption cannot be obtained unless the ship's captain or other designated individual becomes a pilot, in which case the feeder service would probably lose that individual to the Pilotage Authority. In the overall context, Seaway tolls are not excessive, but incentives to encourage short sea shipping could be considered. The Halifax terminals and the Port of Halifax have in the past reduced rates to develop services to new markets. In this instance, cargo is already moving by rail to Ontario and a feeder would not open up any new markets, so there is little incentive to reduce rates, other than certain efficiencies that could be gained by virtual ship-to-ship load and unloading.

It is essential to maintain a weekly service, which rules out the use of tug and barge combinations, even if they were less expensive than feeder vessels. In order to keep the supply chain intact, winter service needs to be offered. The two alternatives we examined via Montreal and Albany are not feasible, as they add too much cost to the overall package. The notion of stockpiling cargo in Montreal is not viable for either domestic or international cargo, as modern supply chain requirements dictate regular, frequent deliveries. As critical as winter service is to the viability of the service, it is not sufficient justification to keep the Seaway open year round, or to expand it. Even with year-round operation, the potential service is not financially viable except for two scenarios whereby either domestic and international cargo are carried on a 50:50 basis or the vessel carries 100% domestic intermodal cargo. As mentioned above, however, there was limited interest on the part of domestic shippers, except for their *international* cargo.

All of which is not to suggest that Transport Canada give up on developing short sea shipping. In our view, rather than focus on the present service, policy makers and short sea shipping entrepreneurs should concentrate on the following opportunities:

- Routes where short sea shipping can help to overcome traffic or border congestion: e.g., Highway 401;
- Routes where there is no rail alternative: e.g., Quebec north shore to Montreal/Great Lakes or Halifax;
- Routes across the Great Lakes that are not subject to either Canadian coasting legislation or US Jones Act restrictions, which could alleviate severe congestion and which would not be restricted by Seaway closure;
- Intercoastal short sea opportunities between Atlantic Canada and US east coast and Bermuda/Bahamas (this is the subject of another ongoing study by Dalhousie University).

If purely domestic short sea shipping is to become viable, however, the single most important issue that needs to be addressed is that of the 25% duty payable on foreign-built ships.

APPENDIX A: LITERATURE REVIEW

MARAD Studies

Title	European Union Short Sea Shipping: European Union Transport Initiatives to Achieve Sufficient Mobility in Order to Sustain Economic Growth
Author	Mark Yonge, Maritime Transport and Logistics Advisors
Publication date	MARAD, Office of Ports and Shipping, April 12, 2004
Summary	This study provides an overview of EU short sea shipping as well as EU Transport policy, of which short sea shipping is an integral part. It is a compendium of the European experience since the early 1990s. It deals with EU Transport Policy for 2010, EU maritime transport policy, short sea shipping in the EU, programs for the promotion of short sea shipping, short sea promotion centres, TEN-T, the "Motorways of the Sea" program, EU financing instruments, the Marco Polo program, and the PACT program. SSS is an integral part of the EU's transport policy, which deliberately seeks to "shift (sic) the balance between the modes of transport [which] is at the heart of the sustainable development strategy". The paper provides a useful definition of short sea shipping, which in the European context is: "maritime transport of cargo and passengers by sea between ports situated in geographical Europe or between those ports and ports situated in non European countries having a coast line on the enclosed seas bordering Europe. It includes domestic and international maritime transport including feeders along the coast, to and from the islands, rivers and states". It concludes that short sea shipping has been successful in Europe because it approaches it as part of a fully integrated transportation system inclusive of all modes.

US Short Sea Shipping Cooperative (SCOOP)

Title	Short Sea Shipping: Prospects and Opportunities
Author	Gary A. Lombardo, Ph.D.
Publication date	November 1, 2004
Summary	This study, done for the US Short Sea Shipping Cooperative (SCOOP), conducts an economic analysis of short sea shipping, examining the cost of building a monohull ro-ro vessel and the resultant freight rate required for profitable operations. The paper contemplates short sea services developing complementary to interstate trucking, rather than in competition with that sector. The critical success factor for adopting short sea shipping is that it must "facilitate cargo movement as an inexpensive, seamless component of an integrated, intermodal transportation system". Advocates of the concept also have to move beyond the discussion stage. Investors should not expect immediate profitability, but a short period before breakeven is reached.

Title	The Public Benefits of the Short-Sea Intermodal System
Author	National Ports and Waterways Institute
Publication date	November 2004
Summary	A short sea system could be expected to have variety of social impacts, including: 1) relieving congestion on busy coastal highways, eliminating or postponing costly road expansion 2) relieving traffic density on some congested rail lines 3) reducing environmental and safety problems related to truck operations 4) introducing a new component to the US intermodal network 5) creating a modern US fleet. The study examines several specific routes, including New York-Boston; New York-Miami, with stops at Charleston and Norfolk. Issues such as the Harbor Maintenance Tax (HMT) need to be addressed, but there are ancillary benefits related to combining both defense and civilian applications of the same type of vessels, which make the concept of short sea shipping worth pursuing.

Recent Media Reports

Title	Brighter prospects for shortsea
Author	Dag Bakka Jr.
Publication date	Scandinavian Shipping Gazette, January 28, 2005
Summary	Of 1,066 million tones of cargo handled within ports in Northern Europe and Norwegian ports in 2001, 45% was liquid bulk, 20-25% was unitized ro-ro or containerized cargo and another 25-30% was pure bulk or semi-bulk cargo. A significant change has been the emergence of the former Soviet Baltic states as new markets. There are significant differences in the short sea fleets of various countries, with Sweden and Finland concentrating on ro-ro and lo-lo vessels for forest and steel products and Denmark concentrating on multi-purpose and container vessels. The German and Dutch fleets consist of multi-purpose vessels for timber, steel and containers. Significantly, the short sea market is becoming very specialized, with services tailored to the logistics of moving forest and other products such as steel and autos.

Title	Change of generation in distribution systems
Author	Par-Henrik Sjostrom
Publication date	Scandinavian Shipping Gazette, January 28, 2005
Summary	Forest products account for 30% of Sweden's export cargo volumes, of which 70% is seaborne. In Finland, about 44% of its export volume is represented by this sector. The forest products industry has developed its own distribution systems for its large cargo flows to mainland Europe. Tight schedules require quality tonnage tailor made for these cargoes, but which are available for other cargoes as well. This situation is exemplified by the relationship between the forest products company StoraEnso and the Swedish shipping company B&N, which is building three new ships as part of StoraEnso's North Europe Transport Supply System (NETSS), which has also seen the development of the StoraEnso Cargo Unit (SECU), a large container specifically designed to carry forest products.

Title	Weserport sees prospects with shortsea container hub
Author	Tom Todd
Publication date	Scandinavian Shipping Gazette, January 28, 2005
Summary	A new small-scale container port is being developed in the Port of Bremen to serve mainly as a feeder and short sea distribution hub, 65 miles upriver from Bremerhaven, the large container port. The Weser is directly linked to Germany's inland waterway and highway networks. The terminal, which will cost €12 million, will be similar to other such terminals at Lubeck, Kiel and Rostock, and will have 210,000 sq. m of open area and 4,500 sq. m of warehousing. Germany's new road tax (Maut) and increased fuel costs are tending to favour the development of short sea options as an alternative to road transport.

Title	NMC – A too steep learning curve
Author	Peter Arentz
Publication date	Scandinavian Shipping Gazette, January 28, 2005
Summary	The Northern Maritime Corridor project (NMC) is intended to connect coastal regions and enhance regional development in the so-called Northern Periphery and North Sea regions of Europe. The article states that what is needed are lower fee levels for coastal transportation to encourage entrepreneurship.

Title	Motorways of the sea – The key to a new ro-ro era
Author	Rolf Petren Nilsson
Publication date	Scandinavian Shipping Gazette, April, 2004
Summary	Of 40,000 cargo and passenger vessels in the world, approximately 1,200, or 3%, are ro-ro cargo vessels. Little new building of pure ro-ro carriers is occurring. If public interest in reducing land traffic congestion is real, perhaps government adjustment of the support network to all modes is required to encourage sea-based transport. The Motorways of the Sea concept launched by the European Union Commission is achieving some support and may be the beginning of a new era.

Title	Since March 8th, Only 18 Hours to Link Rome and Barcelona
Author	Saverio Barbati
Publication date	GrimaldiNaples News, Quarterly Publication of Grimaldi Group, June 2004
Summary	The Mediterranean Short Sea Network created by Grimaldi between Italy, Spain, Malta and Tunisia is transporting hundreds of trailers per day that would otherwise opt for congested overland networks. The Barcelona-to-Rome connection will likely be upgraded to a daily departure in each direction during the next few months. The Grimaldi group firmly believes in the Motorways of the Sea project and has made heavy investments in ships and terminals.

Title	Investing in Quality to Strengthen the Network
Author	Saverio Barbati
Publication date	GrimaldiNaples News, Quarterly Publication of Grimaldi Group, June 2004
Summary	Short Sea Shipping connections will continue to be a strategic development area for the Grimaldi group. The Vice President of the European Commission and Commissioner for Energy and Transport will participate in the Barcelona-to-Rome inauguration. The group has ordered two second-hand multipurpose ro-ro carriers and a new 4,300 vehicle capacity pure car/truck carrier.

Title	"The Jones Act – Again"
Author	Peter Tirschwell
Publication date	Journal of Commerce, May 2004
Summary	Reformation of the Jones Act may be spurred by the increasing emphasis surrounding short sea shipping. The existing short sea market in the US, for all practical purposes, doesn't exist. The US moves no more coastal cargo than it did in the early 1960s according to Army Corp of Engineers statistics. Congestion on the interstate highway system is bad, and will only worsen. It is in every one's interests – those both supporting and not supporting the Jones Act – to obtain a middle ground that will jumpstart the development of a viable short sea shipping industry in the United States.

Title	"Roadblock"
Author	R.G. Edmonson
Publication date	Journal of Commerce, May, 2004
Summary	The once vibrant coastwise shipping industry lost the competitive battle to trucks and railroads 40 years ago. The domestic cargo under the Jones Act is impeding deployment of vessels urgently needed to service the short sea shipping trade. One of three things must happen to lessen the impasse: a) domestic ship builders must become more competitive, b) a short term waiver of domestic building requirements must occur, or c) domestic building requirements must be written out of the Jones Act.

Title	New land-sea bridge is one stop solution
Author	Tom Todd
Publication date	Scandinavia Shipping Gazette, January, 2004
Summary	A new intermodal land-sea container transport bridge has been initiated between Rotterdam, the Rhine port of Duisburg and Rostock for furtherance to Scandinavia. Travel time between Rotterdam and Helsinki on the new service was a saving of up to two days compared with existing shipping links. The short term goal is to move 30,000 containers per year from the Netherlands to Scandinavia.

Title	Via Mare Balticum – The east west intermodal option
Author	Tom Todd
Publication date	Scandinavia Shipping Gazette, January, 2004
Summary	Truck tolls on German highways, border delays and increasing road congestion for east-west transport will increase the viability of direct sea connections using the Baltic Sea. A study entitled "Via Mare Balticum" estimates that savings of up to 29% were possible using an east-west Baltic corridor from St. Petersburg to Hamburg. Further, using large combined ro-ro/container ships instead of conventional ferries on north south connections could result in savings of up to 12%. The current capacity of the marine mode is, however, only capable of taking a small portion of the total demand.

Title	Experts agree in potential of short sea shipping (but how and when?)
Author	Jim McRae and Kathlyn Horibe
Publication date	Canadian Sailings, November, 2004
Summary	A journalistic assessment of the National Marine Conference, hosted by TC and the National Marine and Industrial Coalition, in Montreal in 2004. Potential for short sea trade routes on the Great Lakes and St. Lawrence Seaway system were discussed and the existing available capacity and opportunities for all traffic types highlighted. All participants noted that economic viability must be assured if the concept is to become reality.

Title	Hit the Maritime Highways
Author	Martin Conway
Publication date	Lloyds Ship Manager, May 2004
Summary	This article notes that ro-ro demand, particularly in Europe, has been very strong during the past year. Land-based traffic chaos in Europe is causing the European demand. The European Union's desire to promote short sea shipping is discussed along with a necessity for political support and intervention to assist in successful implementation.

Title	Shortsea – The way forward
Author	Sander van't Verlaat
Publication date	Short Sea Promotion Centre, Holland, June 2003
Summary	A description of the short sea shipping evolution in the Netherlands from the early 1990s to the present is provided. It claims that Rob Bagchus, MD of Deltalings in Rotterdam, was the spiritual father of short sea policy in the Netherlands, which eventually became the catalyst for EU efforts. Evidence of the early Dutch involvement includes the establishment of a Short Sea Promotion Centre in June 1997. Going forward, the Centre anticipates further promotional efforts, cooperation within the European Shortsea Network (ESN), enhanced environmental benefits from modal shifts to SS, further economies of scale as traffic grows, adoption of incentive port dues for SS traffic, introduction of pallet sized containers which are conducive to multimodal usage, and the need to continue to eliminate administrative and custom bottlenecks.

Title	Short Sea Shipping Europe
Author	Editor
Publication date	Short Sea Shipping Europe Bulletin, April 2004
Summary	A series of editorial and news articles concerning short sea shipping policy, shipping routes, and shipping infrastructure is presented in this 10-page bulletin. Editorial commentary included the following projects: • Motorways of the sea is a political rather than a realistic concept; • Purpose of concept is to offer large capacity and high frequencies; • For port-to-port trips the concept is attractive but becomes less so when trips are to/from extended portions of port hinterlands; • Load factors of 80-85% are needed for success; and • Most proponents do not expect these ventures to be particularly profitable

US Domestic Maritime Conference, Hilton Head, April 2005

Title	Competition (or lack thereof) in a Trade Lane with only Two Competitors
Author	Brad Dechter, DHX Dependable Hawaiian Express
Publication date	April 2005
Summary	There is a lack of true competition in the trade between the mainland and Hawaii, with only two carriers, Matson Navigation and Horizon Lines. Matson is vertically integrated, one of the most profitable ocean carriers in the world, and has recently purchased new US flag vessels. Despite some recent financial maneuverings by various companies that have recently owned what is now known as Horizon Lines, no new investment has been made in vessels for over almost 30 years. The duopoly exists because of the so-called Jones Act and has a very serious impact on the provision of competitive shipping alternatives.

Title	Made in the USA
Author	John Graykowski
Publication date	April 2005
Summary	The author bemoans the lack of a comprehensive policy to support commercial shipbuilding in the US. By contrast, foreign shipbuilding is booming. No vessels have been built in the US for operation in international trades in over 20 years, and since 1988, there have only been 30 ocean-going vessels delivered in the US, an average of 1.7 per year. Many Asian yards build this many vessels per month. The author advocates a change in the Jones Act that would allow more foreign content in US-built vessels, perhaps starting with vessels intended for short sea services.

Title	Harbor Maintenance Fee – Stopping Short-Sea Shipping Before It Starts
Author	Greg M. Ward
Publication date	April 2005
Summary	Using the Detroit-Windsor Truck Ferry as a reference point, Ward illustrates that the harbour maintenance tax (HMT) impact is very high both in terms of overall cost and the complexities associated with the determination of freight value, particularly in less than truckload situations. He also asserts that there are some interpretative inconsistencies in the application of exemption qualifications for the HMT. If these difficulties are not sorted out, short sea shipping (SSS) initiatives will not succeed. In his presentation at the conference he also discusses the impact of Canada Customs policies on his operation, which restricts it to 0800-1700, Monday-Friday, without excessive dues being levied, while highway crossings are not subject to these charges.

Title	A Decision Tool for Identifying the Prospects and Opportunities for Short Sea Shipping
Author	Mark Yonge and Lawrence Henesey
Publication date	April 2005
Summary	Through the use of a literature survey, analysis, interviews, questionnaires and expert opinion, an identification of critical decision factors supporting SSS at a particular port was made. The critical decision factors, along with respective weights were: • Demand availability – 12% • Geographic location – 12% • Infrastructure capability – 11% • Intermodal connectors – 11% • Congestion – 9% • Environmental impact – 9% • Financing – 8% • Government funding – 8% • Cost – 7% • Economic development – 7% • Labour – 4% • Transportation culture – 2% Both present and futu (following mitigation) scores are calculated and an assessment can then be made as to whether a particular port should further consider SSS.

Title	The Role of Ports in Infrastructure for Short-Sea Services
Author	Bruce M. Hoch
Publication date	April 2005
Summary	The author cites the increasing concentration of container traffic through a few hub ports and suggests there are three alternatives to move cargo collection and distribution points away from those ports and closer to their ultimate origin or destination: express truckways, express rail corridors or short sea movements by vessel or barge. Examples of the latter already exist between New York and Boston and between New York and Albany. It advocates, amongst other policies, the elimination of the HMT on transhipped containers.

Title	Dedicated Funding for Maritime Research
Author	Richard D. Stewart
Publication date	April 2005
Summary	Virtually no dedicated funding from MARAD was directed toward new maritime technology or research and development between 1996 and 2001. Other agencies funded some research but this funding is project oriented and lacks stability. Marine research has a low profile because most US residents have no appreciation for the importance of this mode in their daily lives. A proposed marine research funding approach is suggested in the following points: • Amend the *Harbor Maintenance Tax Act* to allow a portion of revenues to be dedicated for research; • Allocate 5% of HMT on a marine research program or an annual cycle – based on 2003 payments, research of some US$36 million would result; • A portion of the funds should be directed to National Maritime Enhancement Institutes; and • Research agendas would be developed by interagency and national committees that have been established to coordinate marine policy.

Title	Long-Term Development Trends of US Ports
Author	Asaf Ashar, National Ports and Waterways Institute
Publication date	April 2005
Summary	There is a growing gap between demand and supply for container port capacity in the medium to long term, where growth of 5-6% annually would result in cumulative growth of 300-400% in the next 20 years. Even with technological improvements in container handling, this will likely mean an additional 150% capacity required. Interestingly, the author states that only two ports on the US east coast, Halifax (sic) and Norfolk are capable of handling post-Panamax vessels. The paper envisions hub and spoke operations from Freeport, Bahamas, or a purpose-built transhipment hub somewhere on the east coast. It also envisions distribution centres in the vicinity of secondary "feeder" ports and the re-emergence or "reversal of fortune" of such secondary ports as larger hubs become more congested.

Title	Containerized Articulated Tug-Barge Option for Short-Sea Shipping and Modal Shift from Highway to Intra and Intercoastal Water Movement
Author	John Kratochvil, Oregon State Dept. of Agriculture
Publication date	April 2005
Summary	This paper advocates the use of articulated container tug-barges (AT/B) as a less costly alternative to conventional container vessels. The author believes the concept is viable for the movement of frozen fruit and vegetables, dried products and canned goods. He also asserts that the full cost of trucking should be considered and applied by lawmakers, as should the environmental costs.

National Maritime Conference, Montreal, November 2004

Title	Fuelling an Economic Engine: Waterborne Commerce and the Fraser River
Author	Capt Allen Domass
Publication date	November 2004
Summary	This paper provides some interesting data supporting the development and investment in SSS. One barge carries as much as 656 trucks and 15 jumbo rail cars. A container barge keeps 198 containers off urban roads. Waterways offer a dedicated right of way, lower public infrastructure cost and fewer social and environmental impacts. The west coast offers some short sea success stories, such as Seaspan Coastal Intermodal and LeHigh Cement. The Sylvan Distribution centre handles 1 million tonnes of newsprint, while the Coast 2000 terminal will handle forest products arriving from coastal areas to be stuffed into containers prior to being delivered to one of three container terminals.

Title	Short Sea Shipping: Where are we going?
Author	John Jamian, Deputy Maritime Administrator
Publication date	November 2004
Summary	From MARAD's point of view, US global trade is expected to double by 2010, and 10,000 more trucks per day are expected on the I-95 corridor. Highways cost US$32 million per mile and interchanges can cost $100 million each. Short Sea Shipping is seen as a possible solution, but it must offer service reliability, frequency and competitive pricing. Ships are more fuel efficient than either railways or trucks and one barge can hold the same amount of cargo as 180 trucks. MARAD has taken a number of initiatives to promote SSS.

Title	Short Sea Shipping: Great Lakes/Seaway Perspectives
Author	Richard Corfe
Publication date	November 2004
Summary	From the Seaway's perspective, SSS is important to the future of the Seaway, to the Great Lakes and Seaway stakeholders, and to the population, communities and countries that border the Seaway. Overall tonnage handled by the Seaway has been declining since 1979, when it reached 75 million t. Presently, it stands at about 40 million. The navigation season is now about nine months long. Challenges facing the Seaway include aging infrastructure, an aging and decreasing fleet, a reduction in traditional staples handled by Seaway vessels, door-to-door logistical chains and increased competition from other gateways. Highway H_2O was conceived to promote the waterways of both the Great Lakes and St. Lawrence.

Title	Canadian Shipping Policy: Why it needs to change
Author	Richard Hodgson
Publication date	November 2004
Summary	Canada has two different shipping policies. For the domestic market it is protection. For the international market it is laissez-faire. The current domestic policy stems from the Darling Report of 1970. Imported vessels are subject to 25% duty and there are conditions for temporary entry if no suitable ship is available whereby a temporary entry fee is applied. Officially, Canada strives for domestic "equality of treatment" between modes. The policy also provides a measure of protection for the Canadian shipbuilding industry. This policy runs counter to every other maritime nation. The EU has liberalized its cabotage access regime and certain states (UK and Norway) have no cabotage restrictions, but impose manning constraints. These measures have tended to facilitate domestic and international competitiveness and mobility. The author argues the tariff has to go (gradually) and Canada needs to provide fiscal and seafarer tax relief.

Title	Forest Products Association Canada Presentation to the National Marine Conference on Short Sea Shipping
Author	David Church
Publication date	November 2004
Summary	The forest industry is the largest user of Canada's transportation system and the largest exporter through Canadian ports. Eighty percent of product is shipped to the US but only 3% of this goes by coastal shipping. Just-in-time delivery requirements and market conditions dictate that forest product firms get their goods to the customer on the customer's schedule – trucking does this better than other modes. To be a viable option SSS must be readily available, dependable, and consistent and cost competitive. SSS usage will grow if these conditions are met.

Title	Short Sea Shipping in the Great Lakes
Author	Keith Robson, Hamilton Port Authority and Marine Link
Publication date	November 2004
Summary	A general consideration of several SSS opportunities in the Great Lakes leading to conclusions about the utilization of the Port of Hamilton in several of the proposed applications is developed. The author believes a Halifax-to-Hamilton service would be marginally profitable if confined to 40 ft. trailers. It would have impediments arising from the Seaway season, capital and operating costs stemming from Canadian flag requirements, labour costs, service frequency and pilotage costs. A Hamilton-to-Montreal tug and barge service with a twice weekly frequency would appear to be cost competitive but would require integration with liner company schedules and with trucking companies. Structural impediments to cross-lake traffic and usage of the Port of Hamilton include the US Harbor Maintenance Fee, a full user-pay philosophy in Canada, US security and inspection standards, and opening of the Hamilton lift bridge for 12 months of the year. Long term viability of SSS in the Great Lakes using Canadian flagged vessels must mitigate associated costs and costs associated with pilotage.

MARAD Conference, New York, October 2004

Title	Draft Summary MARAD 3rd Annual Short Sea Shipping Conference, NYC, October 13-15, 2004
Author	MARAD staff
Publication date	
Summary	This document provides a useful summary to all the presentations made at the 3rd MARAD Short Sea Shipping Conference.

Title	Short Sea Shipping: The European Experience
Author	Ministerie van Verkeer en Waterstaat
Publication date	October 13, 2004
Summary	The EU has a short sea policy because of its congested road network and its impact on both the economy and the environment. SSS handles 40% of Europe's Tkm, compared with 45% by road. By 2013 the EU desires 60% to be handled by sea. The existing Marco Polo short sea promotion program, which will provide €100 million from 2003-06, is expected to be significantly enhanced for the period 2007-13.

Title	EU Policy to Promote Short Sea Shipping
Author	Cristobal Millan de la Lastra, Policy Officer on SSS
Publication date	October 2004
Summary	SSS is the fastest growing freight transport mode in Europe, but a number of problems persist, including insufficient integration of the intermodal supply chain and administrative complexity as well as a lack of efficiency, flexibility and transparency in ports. Short sea promotion centres exist in 16 EU countries. The Marco Polo program is intended to assist new short sea ventures with start up aid, catalyst actions and common learning. A new initiative called Motorways of the Sea has the objective of according maritime links the same importance as land links. These projects must develop transnational links and be proposed by at least two member nations. Financing will be provided for port infrastructure, ice breaking and dredging, IT and start-up funding.

Title	Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions on Short Sea Shipping
Author	(appears to be background paper for presentation above)
Publication date	February 7, 2004
Summary	The paper states SSS grew 25% from 1995-2002 and now accounts for 40% of all Tkm in Europe. The overall objective remains that of shifting goods transport from road to sea, as opposed to passengers, as the environmental benefits are seen to be greater. It reiterates the findings of the White paper on European Transport Policy for 2010, which emphasizes the concept of Motorways of the Sea, which should become part of the TEN-T similar to highways and railways. They should become part of the door-to-door logistics chain and offer service that can compete with road in terms of transit time and price. It contemplates such services in the Baltic, western Europe, southeast Europe and southwest Europe.

Title	Demand for Short-Sea Shipping: Key Issues and Next Steps
Author	Jim Brogan, Cambridge Systematics Inc.
Publication date	October 14, 2004
Summary	This paper looks at the elements of a short sea service, the key issues in determining demand and critical next steps toward developing short sea services. Infrastructure involves ports, vessels and intermodal access. Operations involve service frequency, reliability and visibility. Demand is determined by logistical patterns and service needs. As yet, there has not been a comprehensive look at the types of supply and distribution chains that could be candidates for diversion to short sea services and there is little understanding of the cost/speed/reliability of SSS compared with other modes. In order to move forward, partnerships need to be forged between DOTs and economic development agencies, with a committed industry partner that has the right logistics patterns and service needs. It also suggests a pilot program and other incentives may be required.

Title	Cross Border Short-sea Shipping Study
Author	Cambridge Systematics Inc.
Publication date	Transport Canada, May 2004
Summary	This study examined cross-border trade flows between the US and Canada in the Cascade gateway region, focusing on the Blaine, Washington, commercial truck crossing. It is the fourth busiest crossing along the Canada-US border and the vast majority of traffic in the regions moves between Vancouver and Seattle. The study examines existing coastal marine services on the west coast, and assesses the potential for cross-border SSS. It found that there are few existing cross-border short sea services. Those that do exist serve three markets: bulk raw materials and semi-finished products such as aggregates; ferry services; services from BC to Alaska for both ferry and barge traffic. There are, however, a substantial number of domestic short sea services on both sides of the border. Factors affecting the viability of cross-border services are trade and customs regulations, security issues, port infrastructure, vessel technology, operational issues, institutional issues and cost.

Title	A Perspective on the Potential US Domestic Short Sea Shipping Market
Author	John G. Reeve
Publication date	October 2004
Summary	The total potential market for US coastwise shipping is 80 million truckloads of a total intercity market of 527 million, including US and NAFTA traffic. On the east coast, the northbound volume is 50 million, while southbound is 26 million. Lanes originating in the Gulf and South Atlantic are the largest, with the Gulf/New York/New Jersey/Pennsylvania being the biggest individual lane. Manufactured goods and foodstuffs are the majority of loads except for the Gulf, which ships mostly processed materials. The paper makes the point that a coastal shipping service needs to capture a relatively small share in order to be viable, although this will differ between north and southbound. Domestic coastal shipping needs to be competitive with both truck and intermodal service; it needs to be cheap and dependable and will probably require ships of 25 kn rather than tug and barge operations of 8-9 kn.

Title	Ports, Highways and Ships: A Highway of the Sea Alternative?
Author	Ben Hackett, Global Insight
Publication date	October 14, 2005
Summary	The hurdles that SSS must overcome are numerous and include the complexity of marine facilities, liability and legal issues, business attitudes of logistics and transportation providers, service frequency, regularity and speed of delivery and additional costs such as port dues, stevedoring, taxes and double handling. The paper argues there has been an apparent lack of success in both Europe and the US and success has come through a dedicated product base (paper and autos) or industrial group from producer to distributor. Costs to establish short sea services are high compared with trucking so a "helping hand" may be needed. This requires public support such as France's Autoroute de la Mer. The Marco Polo program in Europe provides 30% co-financing of eligible projects. Any financial support must be sufficiently long term to match the ROI required, usually 5-7 years. Another issue is whether to provide service with or without drivers and whether ro-ro or lo-lo.

Title	Short Sea Shipping – Building the Constituency
Author	I-95 Corridor Coalition
Publication date	October 2004
Summary	The I-95 coalition is an alliance of transportation agencies, toll authorities, and related organizations, including law enforcement agencies from Maine to Florida with affiliate members in eastern Canada. The organization has a mandate for projects/activities to improve management/operations of the region's transportation network. They articulate the challenges of congestion and the opportunities for SSS to play a role in its relief. Missing from the analytical tool box at the moment are: • A full appreciation of the entire supply chain and intermodal requirements; • Accurate market or demand assessments for SSS services including commodities apt to divert and their origins/destinations; • Engagement of all stakeholders – not all State DOTs or metropolitan organizations have been consulted/involved; and • Definition of public policy implications at all governmental levels. Missing or underdeveloped components will have to be addressed to ensure SSS success.

Title	The Barge Feeder Service for the Bridgeport Port Authority
Author	Bridgeport Port Authority and Seaworthy Systems, Inc.
Publication date	October 2004
Summary	Bridgeport is the only active port authority in Connecticut, although there are other ports handling cargo. A ferry operates to Long Island and carries 450,000 vehicles and 850,000 passengers annually. The port and state are actively promoting the concept of a ro-ro container barge/feeder from Port Elizabeth, NJ, that would take 33,000 containers per annum off I-95. The anticipated service will have a 24 hour turnaround and operate 5 days per week, comparable to trucking. The service will be ro-ro with a ramp on the barge. The proposed cost is US$675 vs. US$735 for trucking from Hartford to NYNJ return. These costs include US$25 tonnage fee, US$50 gate charge, US$200 barge load/discharge and $200 for the tug and barge.

Title	Short Sea Shipping Program: MPO Role and Bridgeport's Experience
Author	Greater Bridgeport Regional Planning Agency, CT
Publication date	October 13, 2004
Summary	The main issues for consideration are overcapacity of I-95, limited regional rail freight service, an underutilized harbour in Bridgeport and congestion at NYNJ ports. A roll-on/roll-off barge service 5 days a week is contemplated, which would carry 60-90 boxes per day or 15,000-23,000 per annum. The project involved public and private sector participation.

Title	New Trends Discussion: Growth of Technology and Service Innovation: Trans Sea Lifter (TSL) and TSL-System
Author	Hermann J. Janssen, Navtec Consult, Emden, Germany
Publication date	October 2004
Summary	The TSL-System is designed for short sea and river sea routes with a high throughput of disparate cargoes and which operate on a liner schedule. The Small Waterplane Area Twin Hull (SWATH) type vessel is 185 m loa, 80 m beam and 12 m draft, with 20 kn speed, 18,000 tonnes cargo capacity and a crew of 16. It is claimed that one TSL vessel operating between Rotterdam and Humber River in the UK can do the work of 8.17 200-TEU feeder vessels.

Title	New Trends and Technology in Short Sea Shipping
Author	Kenneth Szallai, Lake Express
Publication date	October 2004
Summary	The newest trend is forming corporate entities to take advantage of opportunities presented by high speed technologies in short sea applications. Lake Express had to overcome significant regulatory and political hurdles to launch the first high speed operation between US ports. The ship originally built carried 250 passengers, 46 cars and a crew of eight and cost US$18 million. The author advises building a ship the market will support, not one the yard has already designed.

Title	Container on Barge
Author	Rick Couch, Osprey Line
Publication date	October 2004
Summary	Osprey Line has emerged as one of two container/barge carriers in the US feeder market. The company was established in March 2000 and has several feeder services, including Houston-to-New Orleans and another service linking Lake Charles and Jacintoport, Houston, Barbours Cut, Baton Rouge, Memphis and New Orleans, which carried 17,000 and 30,000 containers, respectively, in 2004. It caters to ocean carriers and major domestic shippers and competes with rail and truck. Its operations in "outports" are very cost effective and efficient. Using mostly tug and barge, the company recently converted an offshore supply boat into a feedership.

Title	PIDN Executive Summary
Author	Bill Ellis, PANYNJ, and Frank Keane, Albany Port District
Publication date	April 2004 and October 2004
Summary	The paper describes PIDN or the Port Inland Distribution network developed by the Port Authority of New York New Jersey. Its benefits are expected to include reduced costs for inland transportation, reduced per container assessments, reduced chassis and empty placement costs, new opportunities for value-added services, PANYNJ container terminal productivity improvement, reduced highway congestion and reduced air emissions. A number of routes are contemplated for development, including Albany, NY, Bridgeport, CT, Camden, NJ, and Davisville, RI. Amongst the innovations to be introduced are direct barge to warehouse delivery inside the gate, enabling the growth of distribution centres, value added, transloading and JIT operations.

Title	Port of Albany
Author	Frank Keane and Tony Vasil
Publication date	October 13, 2004
Summary	The Albany container service finally came about in 2003 after an investment of about $3 million. Service is provided by a number of private sector entities including Columbia Coastal Transportation and Federal Marine Terminals. Weekly service is provided at a cost of US$350 per container round trip. Volumes started very low at 4 containers the first week to a peak of 540 in July and August in 2004. Challenges remain long term funding, convincing the ocean carriers to use the service and penetrating the Canadian market. (At the conference there was some discussion regarding service frequency and the notion that a weekly service is not sufficient.)

Title	Short Sea Shipping and Pennsylvania
Author	Herb Packer, PennPORTS
Publication date	October 13, 2004
Summary	In Pennsylvania, SSS is contemplated to support growth and trade, relieve road congestion, create jobs and mitigate and reduce environmental impacts. Three areas are being examined: Pittsburgh, the Delaware River and the Port of Erie. The state recognizes the need for public-private partnerships to assist in the initial stages at least. Commodities such as steel coils could be moved by short sea barges. Likewise, they see potential for cross-lakes short sea services between Ontario and Erie, PA.

Ro-Ro 2004 Presentations, Gothenburg, May 2004

Title	The Marco Polo Programme, Presentation Notes
Author	Helmut Morsi, EC DG of Energy and Transport
Publication date	Ro-Ro 2004, Gothenburg, October 2003
Summary	The objective of the Marco Polo Program is to shift all increases in international freight in the EU to non-road modes. Three specific programs are involved: Motorways of the Sea, Rail Synergy, and Traffic Avoidance. Eligibility for EC funding is restricted to commercial undertakings involved in freight transport in and near EU states. Guidelines for modal shift actions and catalyst actions are noted. Catalyst actions include: • Motorways of the sea, international non-stop railway services; • High speed freight trains on international routes, and high quality well-integrated inland waterway services; • Improving the inland waterway sector, pools for tri-modally compatible intermodal loading units and reliable transport and logistics information system.

Title	EU Policy to Energize the Modal Shift to Sea Highways
Author	Cristobal de la Lastra
Publication date	Ro-Ro 2004, Gothenburg, May 2004
Summary	SSS freight growth has kept pace with road freight growth in the EU over the past decade. This paper outlines key required legislative (5), technical (4) and operational (5) actions for the enhancement of SSS. *Legislative* • Implementation of standardized reporting formalities acceptance of standardized forms; • Implementation of Marco Polo; • Standardization/harmonization of intermodal loading units; • Motorways of the Sea – efficient, regular and frequent services. *Technical* • Improvement of SSS environmental performance – sulphur dioxide emissions reduction; • Identification and elimination of obstacles to SSS success; • Computerization of Community Customs Procedures; • Research and technological development. *Operational* • One-stop administrative shops; • Ensuring SSS focal points – promotional individuals in each member state; • Good functioning of, and guidance to, SSS Promotion Centres; • Promotion of SSS as a successful transport alternative; • Collection of statistical information.

Title	Maritime Highways – How can the political dreams be realized
Author	Mike Garrat
Publication date	Ro-Ro 2004, Gothenburg, May 2004
Summary	The challenge is to find the means whereby public sector funding can assist the largely private sector shipping industry in expanding its role for the common good by reducing the environmental impact of road haulage without bankrupting shipping lines during a transitional phase. Garrat asserts that the subsidization provided to SSS through the Marco Polo initiative will only cover 3-4% of costs during a start-up period. Because of the low level of subsidization and the possibility of legal challenges stemming from parties protesting unfair competition, the Motorways of the Sea program may fail. He believes success will be supported by developing logistical hubs at port locations (not at inland locations), subsidizing SSS to reflect true road haulage costs, which include a high environmental component, and using the economies of scale provided by ship transport, i.e., less emphasis on frequency, more on capacity. Based strictly on costs, they estimate that there are 2-3 million container shippers who would prefer SSS alternatives in Western Europe alone.

Title	Integration of Sea Land Technologies for an Efficient Door-to-door Intermodal Transport
Author	Dr. Carlo Camisetti
Publication date	Ro-Ro 2004, Gothenburg, May 2004
Summary	This paper describes a three year integration project subsidized by the European Commission and designed to enhance SSS and Motorways of the Sea execution. Existing achievements include new automated guided vehicle (AGV) systems for loading and unloading of ro-ro ships and terminal operations, terminals with 500 TEU/hr capacity and new ro-ro and RoPax ships specifically designed for AGVs. Integrated technologies can increase terminal productivity from 20,000 TEU per hectare per year to 35,000 TEU/ha/yr. Demonstration sites in Goteborg, Geneva and Cagliari Gioia Tauro have been chosen.

Title	Short Sea Shipping in the USA
Author	Robert Kunkel
Publication date	Ro-Ro 2004, Gothenburg, May 2004
Summary	Research undertaken in support of the Transportation Equity Act (TEA 21) has determined that alternative water borne modes of transportation must be developed to build additional capacity in the US transportation system. A combination of insufficient funding for repair of existing highways and additional highway capacity and new hours of work legislation (adding costs to the truck mode) are making SSS's timing right. It is apparent that the following steps are required to support SSS development: • Government funding; • Greater public awareness of SSS alternatives; • Research and analysis program support; • Removal of the HMT for domestic coastal intermodal trade (container shipment costs $50-$100 per unit cheaper); • Recognition that SSS development will enhance both homeland security and national defence; and • Making SSS compatible with the dominant 53 ft. trailer being moved by the trucking industry.

<table>
<tr><td>Title</td><td>Reducing Environmental Impact when Shifting to Waterborne Transportation</td></tr>
<tr><td>Author</td><td>Bjorn Nyberg</td></tr>
<tr><td>Publication date</td><td>Ro-Ro 2004, Gothenburg, May 2004</td></tr>
<tr><td>Summary</td><td>This article describes societal monetary benefits achieved by shifting goods from road to waterborne transport and develops environmental benefits for a specific example of shifting goods from road to an inland ro-ro mode of transport. Societal benefits are noted in the table below:
External Costs in Euros per 1,000 Tkm
<table>
<tr><th>Cost Element</th><th>Road</th><th>Rail</th><th>Inland Waterway</th><th>Short Sea</th></tr>
<tr><td>Accident</td><td>5.44</td><td>1.46</td><td>0</td><td>0</td></tr>
<tr><td>Noise</td><td>2.14</td><td>3.45</td><td>0</td><td>0</td></tr>
<tr><td>Pollutants</td><td>7.85</td><td>3.8</td><td>3.0</td><td>2.0</td></tr>
<tr><td>Climate costs</td><td>0.79</td><td>0.5</td><td>Negligible</td><td>Negligible</td></tr>
<tr><td>Infrastructure</td><td>2.45</td><td>2.9</td><td>1.0</td><td>Less than 1.0</td></tr>
<tr><td>Congestion</td><td>5.45</td><td>0.235</td><td>Negligible</td><td>Negligible</td></tr>
<tr><td>Total</td><td>24.12</td><td>12.35</td><td>Maximum 5.0</td><td>Maximum 4.0</td></tr>
</table>
The specific example developed produces environmental benefits for every type of emission except carbon dioxide.</td></tr>
</table>

Title	Linking Ro-Ro Services with Intermodal Rail Links
Author	Falk Ohlig and Antje Falk
Publication date	May 2004
Summary	The Port of Lubeck, Germany, located on the Baltic Sea, has developed one of the most imaginative short sea terminals in Europe. The port handles about 700,000 trucks and trailers per annum and 4 million tonnes of forest products. It has numerous ro-ro sailings per week to Sweden, Finland, Estonia, Latvia and Russia. It is the most southwesterly port in the Baltic and has the shortest and fastest links to the industrial centres of Germany and the EU. Its terminal at Skandinavienkai has been designed for direct transfer from ship to rail – in some cases the rail cars themselves – and frequent rail shuttles to Hamburg and many other inland destinations.

Title	From Greenfield to Major Ro-Ro Port
Author	Eddie Freeman
Publication date	May 2004
Summary	The Humber River is the prime gateway for the northern sector of the UK. It circumvents the southern UK motorway system and maximizes the haulage leg to and from the Midlands. The port is #1 in volume in the northern sector and growing at 5% per annum. Humber Terminal was a speculative development that opened in 2000 and created competition on the Humber River. It is linked to rail service and an import distribution centre. It has four berths with two more to be opened in December 2005.

Title	Investing in Ports and Ships: Constructive Solutions for the EU
Author	Emanuele Grimaldi
Publication date	May 2004
Summary	Grimaldi's European network consisted of two vessels 10 years ago. Today, it comprises vessels, terminals, logistics companies and software throughout the EU and Mediterranean. The company also has a global network including services to North America (ACL), South America, Euro-Med and West Africa. It has embraced the concept of Motorways of the Sea, with several services in the Med, as well as between Scandinavia and the Med, and the UK and Ireland and the Med. Its short sea services are served by five vessels on four routes: Rome-Barcelona; Salerno-Valencia; Salerno-Palermo-Tunis-Malta; Livorno-Valencia. It also has four PCTCs carrying 25,000 vehicles per month on its Euro-Aegean service. The maritime mode allows it to offer clients 10-year contracts at fixed rates and 30% reductions in real terms at the end of the period.

Title	IPSI Cassette Handling System
Author	Goran K. Lyrstrand, TTS Ships Equipment
Publication date	May 2004
Summary	The Integration project was a demonstration project aimed at developing an economical door-to-door SSS service using the ro-ro concept. It sought to speed up the loading and unloading of such vessels. An important feature is the design of new ships' ramps that are the full breadth of the vessel. Each lane could be dedicated to a single port. A cassette system, including automatic lashing, was developed as was double stacking of containers on deck. An AGV was also developed that proved that a vessel could be loaded in less than one hour.

Title	RoPax Ferries – A Solution for Sea Highways?
Author	Hans Isler, Grimaldi Ferries
Publication date	May 2004
Summary	A RoPax is a ferry that offers high freight capacity, a moderate number of good passenger accommodations and fair to excellent speed. The author is of the opinion that to get heavy traffic off the road you need to be able to carry not only the trailers but also driver-accompanied vehicles. For this, vessels able to carry more than the traditional 12 drivers are required. The distinction between a RoPax, a ferry and a cruise ferry is becoming blurred to the point where in future there will only be RoPaxes and cruise ferries. Grimaldi Naples has a vessel on the Rome-Barcelona service that carries 1,850 lane m of cargo, 100 cars and 1,400 passengers, with 200 passengers in cabins.

Title	Cargo Handling with Straight Lanes and Automatic Lashing Concepts for the INTERMODESHIP
Author	Leonart Svensson, TTS Ships Equipment
Publication date	May 2004
Summary	INTERMODESHIP is an EU project carried out by 18 companies and institutions from nine European countries. Its goal is to develop faster cargo handling and better use of cargo space generally and, specifically, to load 48 trailers on board an 88 m vessel. Cargo units include trailers, swap bodies and containers. The first conclusion is that straight lanes are needed. Straight Lanes – Straight Access-Straight Forward. Automatic securing of cargo is facilitated as is the potential for use of AGVs. More lane m can be utilized within the same dimensions of the vessel.

Title	Ro-Ro Vessels of the Future
Author	Rolf Nagel, Flensburger Schiffbau-Gesellscaft
Publication date	May 2004
Summary	Since 2000, this shipyard has signed contracts for 22 ro-ro newbuildings, and 15 vessels had been delivered as of May 2004. The range of sizes is 2,640-3,830 lane m, or 23,000-32,200 grt. Four areas determine design: market requirements; economics; rules and regulations; performance-based design. Congestion on European roadways has driven the need to move more cargo, hence vessels are getting larger. Size is also a factor in vessel economics and achieving economies of scale. Loading and unloading procedures affect vessel turnaround. A turnaround time of six hours with loading and unloading of 257 trailers in this period has been the recent target.

Shortsea Shipping Conference, Hilton Head, April 2004

Title	Are major landside corridors reaching capacity?
Author	LTG Kenneth Wykle
Publication Date	April 2004
Summary	The author concludes there are choices to be made relative to how the US's transportation infrastructure evolves. The country can continue to "pave over the countryside" and urban areas but this will only lead to increased congestion, reduced productivity and reduced international competitiveness. Instead, it could shift long hauls to truck lanes or high speed SSS, which would improve air quality and introduce "traffic-calming" opportunities. "The economic results of embracing this opportunity to modernize the transportation infrastructure would include a reduction in supply-chain costs and much greater delivery reliability."

Title	Short sea shipping: Building the constituency
Author	John Baniak, I-95 Corridor Coalition
Publication Date	April 2004
Summary	The I-95 Coalition comprises a number of groups along highway I-95 from Maine to Florida who wish to integrate SSS into the region's transportation system. The Coalition is increasingly concerned about the capacity of ports and intermodal terminals, where throughput has increased substantially in the past decade, and is expected to double again in the next decade. This will affect transportation, economic competitiveness and community and environmental vitality. SSS has emerged as a strategy that could mitigate the effects of congestion and increase the overall capacity of the freight system. The author contends that what is missing from analyses of SSS thus far is "an understanding of how SSS operations fit within existing intermodal transportation systems and supply chains".

Title	How will existing modes increase demand?
Author	William J. Coffey, Beaufort Maritime Group
Publication Date	April 2004
Summary	The author suggests that "the development of competitive, innovative SSS services can result in meaningful reductions in the volumes of international and domestic freight moving on Northeast Corridor highways". Of the 6 million TEUs handled in northeast corridor container ports, 80% have origins or destinations that cannot be realistically served by short sea services. Thus, to be viable, they must attract domestic freight. If vessels cannot be built in a timely and economical manner in the US, the author is of the belief that operators should have the freedom to build or charter from international sources, as do other US businesses.

Title	Turning the sea into a bridge
Author	Stephen Flott, Seabridge USA
Publication Date	April 2004
Summary	The author is convinced that services that use the sea to increase the productivity and efficiency of the trucking industry will enable the marine sector to add significant freight capacity to the US transportation system. His company envisions moving 125+ tractor trailers at speeds of 40 kn. Service between New London, CT, and Norfolk, VA, would take 12 hours. Likewise, service between New York and Georgia would take 20 hours. The author does not state how much these vessels would cost, where they would be built, or what rate would have to be charged.

Title	Facts and data on the European waterborne intermodal system
Author	William Jan van Vorstenbos, Schneider Logistics Europe
Publication Date	April 2004
Summary	The abolition of customs procedures in 1993 and the introduction of the euro have increased trade among the member states of the EU. However, the average length of haul in European domestic road transport, at 150 km, is much lower than what Americans are used to. Likewise, international movements are only 500 km. In recent years, road transport and short sea have had the upper hand in terms of market share, with the latter at 40% just behind trucking at 45%. Short sea has the largest share of liquid and dry bulk shipping, at 50% and 25%, respectively, while neo-bulk is at 9% and intermodal at 16%. Significantly, intermodal SSS constitutes a majority share (74%) of the total European intermodal transport volume. The author also makes the point that using and growing SS is largely determined by the shape of European geography. He also has some useful recommendations for US SSS advocates: • Focus on lanes where water is inevitable or offers significant advantage; • Short sea must offer a competitive advantage from a cost viewpoint and acceptable levels of service; • Competitive service depends on high frequency of ship departure, fast transit times, port turnaround times and sailing schedule reliability.

Title	Cost comparison: Port of New York and New Jersey to Port of Albany and Port of Rotterdam to Cologne Barge Services
Author	Pete Zantal, PANYNY
Publication Date	April 2004
Summary	About 87% of all containers entering or leaving the Port of New York New Jersey do so by truck and are destined to an area within 250 miles. In Rotterdam, the mix is 32% inland barge and 20% coastal feeder. Lift fees for barges in Rotterdam are very low, at US$38-$88 and the barge terminal inland charges $38. The biggest cost comparison between Rotterdam and New York is terminal lift rates.

Title	Short sea shipping: Atlantic Canada perspective
Author	James D. Frost, MariNova Consulting Ltd.
Publication Date	April 2004
Summary	The paper is a synopsis of the one presented at the Transport Canada short sea workshop in Halifax in October 2003. In discussing Atlantic Canada, it points out that perhaps the most dynamic short sea sector in North America is located in this region, where there are 2.4 million people living in an area the size of Britain and France, which is divided by large bodies of water. There is a wide variety of vessels, from high speed Incat ferries to state-of-the-art feeder vessels, along with much older tonnage.

Title	Short-sea service: How to make it happen
Author	Mark P. Schlefer
Publication Date	April 2004
Summary	This paper discusses ship design, cost structure, financing, entrepreneurship and government leadership. Shorter routes could be served with 18 kn ro-ro's, whereas longer routes may require vessels capable of 25-30 kn. Ro-ro seems most viable because it reduces stevedoring costs. A new financing statue could be enacted that would be limited to SSS, authorizing loan guarantees, etc.

Title	The MTA Ferry System: A cost effective waterborne intermodal system
Author	Fred Sherman
Publication Date	April 2004
Summary	The author states that most effort to date (April 2004) has been concentrated on high speed vessels, which are not cost competitive for commercial freight. He suggests taking a look at moving trailers by sea via ro-ro vessel, rather than ocean containers and lo-lo operations. The MTA system utilizes ro-ro vessels with shallow draft and 15-20 kn speeds. Vessels will be loaded and unloaded in 2 hours at a rate of 150 trailers per hour (this seems optimistic if trailer only).

Title	Pure fast freight ferries for coastal shipping in the US
Author	Asaf Ashar, National Ports and Waterways Institute
Publication Date	April 2004
Summary	This is a summary of Phase III and IV reports, which are available from MARAD. The proposed coastal system would cater to five main elements: 1) targeted cargo – domestic trailers; 2) system uses – trucking companies, major shippers and long express routes; 3) routes – a network of short and long express routes; 4) vessel configuration – relatively fast, small capacity and shallow draft ro-ro vessels; 5) port facilities – small shallow draft all wheel ports located near coastal highways.

Title	Short sea: A viable option in US
Author	Paul F. Richardson
Publication Date	April 2004
Summary	Richardson advocates conversion of offshore supply boats into short sea container vessels. (Osprey Line has done one such conversion.) The builders of such vessels are competitive on world markets and vessels of 400-600 TEU capacity should be viable in short sea trades. Still, a $20 million vessel will cost $16,400 per day.

Title	The future for short-sea shipping in the domestic intermodal freight system
Author	R. Leo Penne
Publication Date	April 2004
Summary	It is not immediately clear that SSS can alleviate road congestion in the US domestic market. However, "modal silos" make less sense than ever. The maritime transportation system has no value without highways. The "problem" is that SSS needs landside investment at ports. Also, is it superior to other options available for the alleviation of congestion or will it simply move the congestion from one area to another? And can it be supported by public-private partnerships?

Title	Domestic Water Transport Comparative Review – US and European Union
Author	Dr. Anatoly Hochstein, National Ports and Waterways Institute
Publication Date	April 2004
Summary	The US has the most extensive inland waterway system in the world, but, unlike other regions in the world, coastal shipping has been in decline since 1970. This paper deals with many aspects but perhaps most useful is the section dealing with policy implementation. In Europe, coastal shipping is encouraged by a variety of methods including liberalization of regulations, modification of the competitive setting, integration of intermodal corridors and direct financial assistance.

Title	Prospects for short sea shipping
Author	Lawrence Henesey and Koen Kereckaert
Publication Date	April 2004
Summary	The authors suggest several actions are necessary to stimulate SSS in Europe: • Integration into multi-modal transport chains or networks; • Stimulation of new maritime transport technologies; • Removal of administrative barriers; • Creation of reliable market data; • Improvement of the image of SSS; • Improvement of transparency in ports related to tariffs and state aids. In the US context, they suggest that coastal "feedering" did not develop because, in the initial stages of containerization, many smaller ports were able to attract large vessels to make direct calls. More recently, mega-sized ships that cannot access all ports are beginning to be introduced and the ports that are able to handle them are becoming increasingly congested. New investment in feeder vessels is hindered by their construction price, the cost of US seafarers and the cost of ILA labour in east coast ports. They suggest there might be a larger role for Halifax and Freeport as transhipment hubs because services emanating from there are not subject to the Jones Act.

Title	Sea of Dreams: If it's built, will they come?: A perspective on some key issues
Author	John Reeve
Publication Date	April 2004
Summary	In terms of its examination of traffic flows and the overall size of the market, this is a similar paper to the one described above. However, it suggests that a vessel service from New York to Miami would be both cost and time competitive with trucking, at US$1,900 for trucking and $1,500 for the marine mode and 2.5 days vs. 3.0 days. This assumes lower manning levels and construction costs 50% lower than those currently prevailing. Of the obstacles identified, shippers need to exhibit a willingness to adapt supply chain strategies for environmental as well as economic reasons.

Academic Papers

Title	Determinants of Mode Choice between Road and Shipping for Freight Transport
Author	Garcia-Menendez, Martinez-Zaroso and de Miguel
Publication date	Journal of Transport Economics and Policy, Vol. 38, part 3, September 2004, pp. 447-466
Summary	This paper examined different factors that would bring about a modal switch as in the case of trucking vs. SSS. Elasticity analysis found sea transport much more sensitive than road transport to variations in its own costs and changes in transport pricing. A large switch to shipping could be expected if road transportation pricing changes. As well, the efficient levying of an "ecotax" on road transport might be in order to achieve a modal balance, at least in the European freight market.

Title	Modelling port/ferry choice in Ro/Ro freight transportation
Author	Mangan, Lalwani and Gardner
Publication date	International Journal of Transport Management, 2002
Summary	This paper examined port/shipping variables in three specific island situations throughout the world. The following table highlights their findings.

Matear and Gray (1993) – Irish sea: all maritime traffic types	Spencer et al. (1992) – RoRo across the English Channel	D'Este and Meyrick (1992) – RoRo between Australia and Tasmania: ferry factors	D'Este and Meyrick (1992) – RoRo between Australia and Tasmania: port factors
Punctuality of ferry	Service frequency	Frequency	Proximity to origin
Space availability	Convenient schedules	Price	Port turnaround time
Service frequency	Delays, cancellations	Transit time	Record of strikes
Response to problems	On fastest route to destination	On-time	Loading facilities
Value for money rate	Space availability	Damage	Port marketing
Ferry arrival time	Fast check -in / disembarkation	Commitment	Port charges
Ferry departure time	Speed of customs	Problems	Tradition
Sea crossing time	On cheapest route to destination	Technology	
Low freight rate	Low tariffs	Extra space	
Carrier relationship	Port vehicle congestion	Door-to-door service	
Proximity to freight destination	Pre-booking facilities	Flexible contracts	
Proximity to freight origin	Chance for driver break	Long contracts	
Special rates/discounts	Ferry drivers' facilities	Promotion	
Shipper preference	Congested roads to port		
	Standard of these roads		

Note: The factors are ranked in descending order or relative importance

Title	Short Sea Shipping: A Canadian perspective
Author	Mary Brooks and James Frost
Publication date	Maritime Policy Management Journal, December 2004
Summary	The authors cite the Canada/US Memorandum of Cooperation on Sharing Short Sea Shipping Information as indicative of growing interest in SSS. The 25% Canadian import duty on foreign-built ships is noted as a large impediment to SSS development. Other Canadian policies/legislation impeding SSS development include the requirement for shipments between Canadian ports to be in Canadian flagged vessels (Canadian flag provisions are very restrictive on both crewing and safety requirements) and a general lack of a legislative/regulatory focal point. The Jones Act in the US is estimated to be a net drain on the American economy of approximately $1 billion annually. No imminent relaxation of cabotage and vessel construction provision of the Jones Act is foreseen despite MARAD's general support for SSS development. In terms of enhancing Canadian opportunities for SSS, a thorough re-examination of marine cabotage legislation and the tariffs on foreign-built ships needs to be undertaken. In addition, the trucking industry needs to be viewed as a partner and fully intermodal solutions pursued. Government sponsored research on commodities with market potential and technologies is also needed.

Appendix B

Pro Forma Spreadsheets

Weekly Halifax-Hamilton Feeder a)
Pro Forma ($C)

Notes

1 **Assumptions:**

Lifts per week	**640**
Halifax (200)	320
Hamilton (200)	320
20'/40' split	
40%	80
60%	120
Ship cost per day	$15,339
TEU cellular vessel	450
Halifax lift cost	$200.00
Hamilton lift cost	$175.00
IFO Fuel Consumption @ tonnes	14
MDO Fuel Consumption @ tonnes	1.2
Fuel Cost	
IFO 380	$313.00
MDO	$576.00

Halifax Pilotage (per direction)	$600.00
Laurentian & Seaway Pilotage	$14,088.00
Can gov't charges	$2,737.00
Seaway tolls	$5,667.00
Revenue	
Revenue per 20'	$450.00
Revenue per 40'	$725.00

2 **Ship Costs:**

Ship x 7 days	$107,373.00	7 Days
Fuel tonnes IFO 180 per day	$21,910.00	5 Days
tonnes MDO per day	$4,838.40	7 Days
Sub-Total: Ship Costs	**$134,121.40**	Sum of ship costs

3 **Fixed Costs:**

Pilotage: Halifax	$600.00	1 Direction
Pilotage LPA	$14,088.00	1 Direction
Can gov't charges	$2,737.00	1 Direction
Pilotage Seaway	$5,667.00	1 Direction
Pilotage Hamilton		1 Direction
Lines: Hamilton	$650.00	LS
Harbour Dues: Halifax	$85.00	LS
Harbour Dues: Hamilton	$128.00	LS
Insurance est.	$2,500.00	LS
Sub-Total: Fixed Costs	**$26,455.00**	Sum of fixed costs

4 **Administration:**

Halifax	$4,500.00	LS Weekly Costs
Hamilton	$3,000.00	LS Weekly Costs
Sub-Total: Administration Costs	**$7,500.00**	Sum of admin costs

5 **Variable Costs:**

Halifax	$64,000.00	1 Direction
Hamilton	$56,000.00	1 Direction
Sub-Total: Variable Costs	**$120,000.00**	Sum of variable costs

6 **Total Costs:**

Ship Costs	$134,121.40	Total from section 2
Fixed Costs	$26,455.00	Total from section 3
Administration	$7,500.00	Total from section 4
Variable Costs	$120,000.00	Total from section 5
TOTAL COSTS	**$288,076.40**	

7 **Revenue:**

20'	$36,000.00	1 Direction
40'	$87,000.00	1 Direction
TOTAL REVENUE	**$123,000.00**	Sum of revenue

8 **Profit/Loss:**

Total Revenue	$123,000.00	From Section 7
Total Costs	$288,076.40	From Section 6
Net Profit/Loss	-$165,076.40	

Weekly Halifax-Hamilton Feeder a)
Pro Forma ($C)

Notes

1 **Assumptions:**

Lifts per week	**400**	
Halifax (200)	200	
Hamilton (200)	200	
20'/40' split		
40%		
60%	200	
Ship cost per day	$15,339	
TEU cellular vessel	450	
Halifax lift cost	$200.00	
Hamilton lift cost	$175.00	
IFO Fuel Consumption @ tonnes	14	
MDO Fuel Consumption @ tonnes	1.2	
Fuel Cost		
IFO 380	$313.00	
MDO	$576.00	

Halifax Pilotage (per direction)	$600.00
Laurentian & Seaway Pilotage	$14,088.00
Can gov't charges	$2,737.00
Seaway tolls	$5,667.00
Revenue	
Revenue per 20'	$450.00
Revenue per 40'	$725.00

2 **Ship Costs:**

Ship x 7 days	$107,373.00	7 Days
Fuel tonnes IFO 180 per day	$21,910.00	5 Days
tonnes MDO per day	$4,838.40	7 Days
Sub-Total: Ship Costs	**$134,121.40**	Sum of ship costs

3 **Fixed Costs**

Pilotage: Halifax	$600.00	1 Direction	
Pilotage LPA	$14,088.00	1 Direction	
Can gov't charges	$2,737.00	1 Direction	
Seaway tolls	$5,667.00	1 Direction	
Pilotage Hamilton		1 Direction	
Lines: Hamilton	$650.00	LS	
Harbour Dues: Halifax	$85.00	LS	
Harbour Dues: Hamilton	$128.00	LS	
Insurance est.	$2,500.00	LS	
Sub-Total: Fixed Costs	**$26,455.00**	Sum of fixed costs	

4 **Administration:**

Halifax	$4,500.00	LS	Weekly Costs
Hamilton	$3,000.00	LS	Weekly Costs
Sub-Total: Administration Costs	**$7,500.00**	Sum of admin costs	

5 **Variable Costs:**

Halifax	$40,000.00	1 Direction	
Hamilton	$35,000.00	1 Direction	
Sub-Total: Variable Costs	**$75,000.00**	Sum of variable costs	

6 **Total Costs:**

Ship Costs	$134,121.40	Total from section 2
Fixed Costs	$26,455.00	Total from section 3
Administration	$7,500.00	Total from section 4
Variable Costs	$75,000.00	Total from section 5
TOTAL COSTS	**$243,076.40**	

7 **Revenue:**

20'	$0.00	1 Direction	
40'	$145,000.00	1 Direction	
TOTAL REVENUE	**$145,000.00**	Sum of revenue	

8 **Profit/Loss:**

Total Revenue	$145,000.00	From Section 7
Total Costs	$243,076.40	From Section 6
Net Profit/Loss	-$98,076.40	

Weekly Halifax-Hamilton Feeder a)
Pro Forma ($C)

Notes

1 **Assumptions:**

Lifts per week	**640**
Halifax (200)	320
Hamilton (200)	320
20'/40' split	
40%	80
60%	120
Ship cost per day	$11,749
TEU cellular vessel	450
Halifax lift cost	$200.00
Hamilton lift cost	$175.00
IFO Fuel Consumption @ tonnes	14
MDO Fuel Consumption @ tonnes	1.2
Fuel Cost	
IFO 380	$313.00
MDO	$576.00

Halifax Pilotage (per direction)	$600.00
Laurentian & Seaway Pilotage	$14,088.00
Can gov't charges	$2,737.00
Seaway tolls	$5,667.00
Revenue	
Revenue per 20'	$450.00
Revenue per 40'	$725.00

2 **Ship Costs:**

Ship x 7 days	$82,243.00	7 Days
Fuel tonnes IFO 180 per day	$21,910.00	5 Days
tonnes MDO per day	$4,838.40	7 Days
Sub-Total: Ship Costs	**$108,991.40**	Sum of ship costs

3 **Fixed Costs:**

Pilotage: Halifax	$600.00	1 Direction
Pilotage LPA	$14,088.00	1 Direction
Can gov't charges	$2,737.00	1 Direction
Seaway tolls	$5,667.00	1 Direction
Pilotage Hamilton		1 Direction
Lines: Hamilton	$650.00	LS
Harbour Dues: Halifax	$85.00	LS
Harbour Dues: Hamilton	$128.00	LS
Insurance est.	$2,500.00	LS
Sub-Total: Fixed Costs	**$26,455.00**	Sum of fixed costs

4 **Administration:**

Halifax	$4,500.00	LS Weekly Costs
Hamilton	$3,000.00	LS Weekly Costs
Sub-Total: Administration Costs	**$7,500.00**	Sum of admin costs

5 **Variable Costs:**

Halifax	$64,000.00	1 Direction
Hamilton	$56,000.00	1 Direction
Sub-Total: Variable Costs	**$120,000.00**	Sum of variable costs

6 **Total Costs:**

Ship Costs	$108,991.40	Total from section 2
Fixed Costs	$26,455.00	Total from section 3
Administration	$7,500.00	Total from section 4
Variable Costs	$120,000.00	Total from section 5
TOTAL COSTS	**$262,946.40**	

7 **Revenue:**

20'	$36,000.00	1 Direction
40'	$87,000.00	1 Direction
TOTAL REVENUE	**$123,000.00**	Sum of revenue

8 **Profit/Loss:**

Total Revenue	$123,000.00	From Section 7
Total Costs	$262,946.40	From Section 6
Net Profit/Loss	-$139,946.40	

Weekly Halifax-Hamilton Feeder a)
Pro Forma ($C)

Notes

1 **Assumptions:**

Lifts per week	**400**	
Halifax (200)	200	
Hamilton (200)	200	
20'/40' split		
100%	200	
Ship cost per day	$11,749	
TEU cellular vessel	450	
Halifax lift cost	$200.00	
Hamilton lift cost	$175.00	
IFO Fuel Consumption @ tonnes	14	
MDO Fuel Consumption @ tonnes	1.2	
Fuel Cost		
IFO 380	$313.00	
MDO	$576.00	

Halifax Pilotage (per direction)	$600.00	
Laurentian & Seaway Pilotage	$14,088.00	
Can gov't charges	$2,737.00	
Seaway tolls	$5,667.00	
Revenue		
Revenue per 20'	$450.00	
Revenue per 40'	$725.00	

2 **Ship Costs:**

Ship x 7 days	$82,243.00	7 Days
Fuel tonnes IFO 180 per day	$21,910.00	5 Days
tonnes MDO per day	$4,838.40	7 Days
Sub-Total: Ship Costs	**$108,991.40**	Sum of ship costs

3 **Fixed Costs:**

Pilotage: Halifax	$600.00	1 Direction
Pilotage LPA	$14,088.00	1 Direction
Can gov't charges	$2,737.00	1 Direction
Seaway tolls	$5,667.00	1 Direction
Pilotage Hamilton		1 Direction
Lines: Hamilton	$650.00	LS
Harbour Dues: Halifax	$85.00	LS
Harbour Dues: Hamilton	$128.00	LS
Insurance est.	$2,500.00	LS
Sub-Total: Fixed Costs	**$26,455.00**	Sum of fixed costs

4 **Administration:**

Halifax	$4,500.00	LS Weekly Costs
Hamilton	$3,000.00	LS Weekly Costs
Sub-Total: Administration Costs	**$7,500.00**	Sum of admin costs

5 **Variable Costs:**

Halifax	$40,000.00	1 Direction
Hamilton	$35,000.00	1 Direction
Sub-Total: Variable Costs	**$75,000.00**	Sum of variable costs

6 **Total Costs:**

Ship Costs	$108,991.40	Total from section 2
Fixed Costs	$26,455.00	Total from section 3
Administration	$7,500.00	Total from section 4
Variable Costs	$75,000.00	Total from section 5
TOTAL COSTS	**$217,946.40**	

7 **Revenue:**

20'	$0.00	1 Direction
40'	$145,000.00	1 Direction
TOTAL REVENUE	**$145,000.00**	Sum of revenue

8 **Profit/Loss:**

Total Revenue	$145,000.00	From Section 7
Total Costs	$217,946.40	From Section 6
Net Profit/Loss	-$72,946.40	

Weekly Halifax-Hamilton Feeder a)
Pro Forma ($C)

Notes

1 **Assumptions:**

Lifts per week	**600**	
Halifax (200)	300	
Hamilton (200)	300	
20'/40' split		
30%	100	
70%	200	
Ship cost per day	$10,361	
TEU cellular vessel	450	
Halifax lift cost	$225.00	
Hamilton lift cost	$175.00	
IFO Fuel Consumption @ tonnes	15	
MDO Fuel Consumption @ tonnes	2.0	
Fuel Cost		
IFO 380	$313.00	
MDO	$576.00	

Halifax Pilotage (per direction)	$600.00	
Laurentian & Seaway Pilotage	$14,302.00	
Can gov't charges	$2,737.00	
Seaway tolls	$8,025.00	
Revenue		
Revenue per 20'	$450.00	
Revenue per 40'	$725.00	

2 **Ship Costs:**

Ship x 7 days	$72,527.00	7 Days
Fuel tonnes IFO 180 per day	$23,475.00	5 Days
tonnes MDO per day	$8,064.00	7 Days
Sub-Total: Ship Costs	**$104,066.00**	Sum of ship costs

3 **Fixed Costs:**

Pilotage: Halifax	$600.00	1 Direction
Pilotage LPA	$14,302.00	1 Direction
Can gov't charges	$2,737.00	1 Direction
Seaway tolls	$8,025.00	1 Direction
Pilotage Hamilton		1 Direction
Lines: Hamilton	$650.00	LS
Harbour Dues: Halifax	$85.00	LS
Harbour Dues: Hamilton	$128.00	LS
Insurance est.	$2,500.00	LS
Sub-Total: Fixed Costs	**$29,027.00**	Sum of fixed costs

4 **Administration:**

Halifax	$4,500.00	LS Weekly Costs
Hamilton	$3,000.00	LS Weekly Costs
Sub-Total: Administration Costs	**$7,500.00**	Sum of admin costs

5 **Variable Costs:**

Halifax	$67,500.00	1 Direction
Hamilton	$52,500.00	1 Direction
Sub-Total: Variable Costs	**$120,000.00**	Sum of variable costs

6 **Total Costs:**

Ship Costs	$104,066.00	Total from section 2
Fixed Costs	$29,027.00	Total from section 3
Administration	$7,500.00	Total from section 4
Variable Costs	$120,000.00	Total from section 5
TOTAL COSTS	**$260,593.00**	

7 **Revenue:**

20'	$45,000.00	1 Direction
40'	$145,000.00	1 Direction
TOTAL REVENUE	**$190,000.00**	Sum of revenue

8 **Profit/Loss:**

Total Revenue	$190,000.00	From Section 7
Total Costs	$260,593.00	From Section 6
Net Profit/Loss	-$70,593.00	

772 teu used purchase 100% 40s

Weekly Halifax-Hamilton Feeder a)
Pro Forma ($C)

Notes

1 **Assumptions:**

Lifts per week	**600**
Halifax (200)	300
Hamilton (200)	300
20'/40' split	
100%	300
Ship cost per day	$10,361
TEU cellular vessel	772
Halifax lift cost	$225.00
Hamilton lift cost	$175.00
IFO Fuel Consumption @ tonnes	15
MDO Fuel Consumption @ tonnes	2.0
Fuel Cost	
IFO 380	$313.00
MDO	$576.00

Halifax Pilotage (per direction)	$600.00
Laurentian & Seaway Pilotage	$14,302.00
Can gov't charges	$2,737.00
Seaway tolls	$8,025.00
Revenue	
Revenue per 40'	$725.00

2 **Ship Costs:**

Ship x 7 days	$72,527.00	7 Days
Fuel tonnes IFO 180 per day	$23,475.00	5 Days
tonnes MDO per day	$8,064.00	7 Days
Sub-Total: Ship Costs	**$104,066.00**	Sum of ship costs

3 **Fixed Costs:**

Pilotage: Halifax	$600.00	1 Direction
Pilotage LPA	$14,302.00	1 Direction
Can gov't charges	$2,737.00	1 Direction
Seaway tolls	$8,025.00	1 Direction
Pilotage Hamilton		1 Direction
Lines: Hamilton	$650.00	LS
Harbour Dues: Halifax	$85.00	LS
Harbour Dues: Hamilton	$128.00	LS
Insurance est	$2,500.00	LS
Sub-Total: Fixed Costs	**$29,027.00**	Sum of fixed costs

4 **Administration:**

Halifax	$4,500.00	LS Weekly Costs
Hamilton	$3,000.00	LS Weekly Costs
Sub-Total: Administration Costs	**$7,500.00**	Sum of admin costs

5 **Variable Costs:**

Halifax	$67,500.00	1 Direction
Hamilton	$52,500.00	1 Direction
Sub-Total: Variable Costs	**$120,000.00**	Sum of variable costs

6 **Total Costs:**

Ship Costs	$104,066.00	Total from section 2
Fixed Costs	$29,027.00	Total from section 3
Administration	$7,500.00	Total from section 4
Variable Costs	$120,000.00	Total from section 5
TOTAL COSTS	**$260,593.00**	

7 **Revenue:**

20'	$0.00	1 Direction
40'	$217,500.00	1 Direction
TOTAL REVENUE	**$217,500.00**	Sum of revenue

8 **Profit/Loss:**

Total Revenue	$217,500.00	From Section 7
Total Costs	$260,593.00	From Section 6
Net Profit/Loss	-$43,093.00	

Weekly Halifax-Hamilton Feeder a)
Pro Forma ($C)

Notes

1 **Assumptions:**

Lifts per week	**900**	
Halifax (200)	450	
Hamilton (200)	450	
20'/40' split		
30%	125	
70%	325	
Ship cost per day	$15,280	
TEU cellular vessel	804	
Halifax lift cost	$225.00	
Hamilton lift cost	$175.00	
IFO Fuel Consumption @ tonnes	15	
MDO Fuel Consumption @ tonnes	2.0	
Fuel Cost		
IFO 380	$313.00	
MDO	$576.00	

Halifax Pilotage (per direction)	$600.00	
Laurentian & Seaway Pilotage	$14,302.00	
Can gov't charges	$2,737.00	
Seaway tolls	$8,025.00	
Revenue		
revenue per 20'	$450.00	
Revenue per 40'	$725.00	

2 **Ship Costs:**

Ship x 7 days	$106,960.00	7 Days
Fuel tonnes IFO 180 per day	$23,475.00	5 Days
tonnes MDO per day	$8,064.00	7 Days
Sub-Total: Ship Costs	**$138,499.00**	Sum of ship costs

3 **Fixed Costs:**

Pilotage: Halifax	$600.00	1 Direction
Pilotage LPA	$14,302.00	1 Direction
Can gov't charges	$2,737.00	1 Direction
Seaway tolls	$8,025.00	1 Direction
Pilotage Hamilton		1 Direction
Lines: Hamilton	$650.00	LS
Harbour Dues: Halifax	$85.00	LS
Harbour Dues: Hamilton	$128.00	LS
Insurance est	$2,500.00	LS
Sub-Total: Fixed Costs	**$29,027.00**	Sum of fixed costs

4 **Administration:**

Halifax	$4,500.00	LS Weekly Costs
Hamilton	$3,000.00	LS Weekly Costs
Sub-Total: Administration Costs	**$7,500.00**	Sum of admin costs

5 **Variable Costs:**

Halifax	$101,250.00	1 Direction
Hamilton	$78,750.00	1 Direction
Sub-Total: Variable Costs	**$180,000.00**	Sum of variable costs

6 **Total Costs:**

Ship Costs	$138,499.00	Total from section 2
Fixed Costs	$29,027.00	Total from section 3
Administration	$7,500.00	Total from section 4
Variable Costs	$180,000.00	Total from section 5
TOTAL COSTS	**$355,026.00**	

7 **Revenue:**

20'	$56,250.00	1 Direction
40'	$235,625.00	1 Direction
TOTAL REVENUE	**$291,875.00**	Sum of revenue

8 **Profit/Loss:**

Total Revenue	$291,875.00	From Section 7
Total Costs	$355,026.00	From Section 6
Net Profit/Loss	-$63,151.00	

Weekly Halifax-Hamilton Feeder a)
Pro Forma ($C)

Notes

1 **Assumptions:**

Lifts per week	**750**	
Halifax (200)	375	
Hamilton (200)	375	
20'/40' split		
100%	375	
Ship cost per day	$15,280	
TEU cellular vessel	804	
Halifax lift cost	$225.00	
Hamilton lift cost	$175.00	
IFO Fuel Consumption @ tonnes	15	
MDO Fuel Consumption @ tonnes	2.0	
Fuel Cost		
IFO 380	$313.00	
MDO	$576.00	

Halifax Pilotage (per direction)	$600.00	
Laurentian & Seaway Pilotage	$14,302.00	
Can gov't charges	$2,737.00	
Seaway tolls	$8,025.00	
Revenue		
Revenue per 40'	$725.00	

2 **Ship Costs:**

Ship x 7 days	$106,960.00	7 Days
Fuel tonnes IFO 180 per day	$23,475.00	5 Days
tonnes MDO per day	$8,064.00	7 Days
Sub-Total: Ship Costs	**$138,499.00**	Sum of ship costs

3 **Fixed Costs:**

Pilotage: Halifax	$600.00	1 Direction
Pilotage LPA	$14,302.00	1 Direction
Can gov't charges	$2,737.00	1 Direction
Seaway tolls	$8,025.00	1 Direction
Pilotage Hamilton	-	1 Direction
Lines: Hamilton	$650.00	LS
Harbour Dues: Halifax	$85.00	LS
Harbour Dues: Hamilton	$128.00	LS
Insurance est.	$2,500.00	LS
Sub-Total: Fixed Costs	**$29,027.00**	Sum of fixed costs

4 **Administration:**

Halifax	$4,500.00	LS Weekly Costs
Hamilton	$3,000.00	LS Weekly Costs
Sub-Total: Administration Costs	**$7,500.00**	Sum of admin costs

5 **Variable Costs:**

Halifax	$84,375.00	1 Direction
Hamilton	$65,625.00	1 Direction
Sub-Total: Variable Costs	**$150,000.00**	Sum of variable costs

6 **Total Costs:**

Ship Costs	$138,499.00	Total from section 2
Fixed Costs	$29,027.00	Total from section 3
Administration	$7,500.00	Total from section 4
Variable Costs	$150,000.00	Total from section 5
TOTAL COSTS	**$325,026.00**	

7 **Revenue:**

20'	$0.00	1 Direction
40'	$271,875.00	1 Direction
TOTAL REVENUE	**$271,875.00**	Sum of revenue

8 **Profit/Loss:**

Total Revenue	$271,875.00	From Section 7
Total Costs	$325,026.00	From Section 6
Net Profit/Loss	-$53,151.00	

Weekly Halifax-Hamilton Feeder a)
Pro Forma ($C)

Notes

1 **Assumptions**:

Lifts per week	**350**
Halifax (200)	175
Hamilton (200)	175
53'/40' split	
50%	75
50%	100
Ship cost per day	$15,339
TEU cellular vessel	450
Halifax lift cost	$200.00
Hamilton lift cost	$175.00
IFO Fuel Consumption @ tonnes	14
MDO Fuel Consumption @ tonnes	1.2
Fuel Cost	
IFO 380	$313.00
MDO	$576.00

Halifax Pilotage (per direction)	$600.00
Laurentian & Seaway Pilotage	$14,088.00
Can gov't charges	$2,737.00
Seaway tolls	$5,667.00
Revenue	
Revenue per 53'	$1,000.00
Revenue per 40'	$725.00

2 **Ship Costs**:

Ship x 7 days	$107,373.00	7 Days
Fuel tonnes IFO 180 per day	$21,910.00	5 Days
tonnes MDO per day	$4,838.40	7 Days
Sub-Total: Ship Costs	**$134,121.40**	Sum of ship costs

3 **Fixed Costs**:

Pilotage: Halifax	$600.00	1 Direction
Pilotage LPA	$14,088.00	1 Direction
Can gov't charges	$2,737.00	1 Direction
Seaway tolls	$5,667.00	1 Direction
Pilotage Hamilton		1 Direction
Lines: Hamilton	$650.00	LS
Harbour Dues: Halifax	$85.00	LS
Harbour Dues: Hamilton	$128.00	LS
Insurance est	$2,500.00	LS
Sub-Total: Fixed Costs	**$26,455.00**	Sum of fixed costs

4 **Administration**:

Halifax	$4,500.00	LS	Weekly Costs
Hamilton	$3,000.00	LS	Weekly Costs
Sub-Total: Administration Costs	**$7,500.00**	Sum of admin costs	

5 **Variable Costs**:

Halifax	$35,000.00	1 Direction
Hamilton	$30,625.00	1 Direction
Sub-Total: Variable Costs	**$65,625.00**	Sum of variable costs

6 **Total Costs**:

Ship Costs	$134,121.40	Total from section 2
Fixed Costs	$26,455.00	Total from section 3
Administration	$7,500.00	Total from section 4
Variable Costs	$65,625.00	Total from section 5
TOTAL COSTS	**$233,701.40**	

7 **Revenue**:

53'	$75,000.00	1 Direction
40'	$72,500.00	1 Direction
TOTAL REVENUE	**$147,500.00**	Sum of revenue

8 **Profit/Loss**:

Total Revenue	$147,500.00	From Section 7
Total Costs	$233,701.40	From Section 6
Net Profit/Loss	-$86,201.40	

Weekly Halifax-Hamilton Feeder a)
Pro Forma ($C)

Notes

1 **Assumptions**:

Lifts per week	350
Halifax (200)	175
Hamilton (200)	175
53'/40' split	
50%	75
50%	100
Ship cost per day	$11,749
TEU cellular vessel	450
Halifax lift cost	$200.00
Hamilton lift cost	$175.00
IFO Fuel Consumption @ tonnes	14
MDO Fuel Consumption @ tonnes	1.2
Fuel Cost	
IFO 380	$313.00
MDO	$576.00

Halifax Pilotage (per direction)	$600.00
Laurentian & Seaway Pilotage	$14,088.00
Can gov't charges	$2,737.00
Seaway tolls	$5,667.00
Revenue	
Revenue per 53'	$1,000.00
Revenue per 40'	$725.00

2 **Ship Costs**:

Ship x 7 days	$82,243.00	7 Days
Fuel tonnes IFO 180 per day	$21,910.00	5 Days
tonnes MDO per day	$4,838.40	7 Days
Sub-Total: Ship Costs	**$108,991.40**	Sum of ship costs

3 **Fixed Costs**:

Pilotage: Halifax	$600.00	1 Direction
Pilotage LPA	$14,088.00	1 Direction
Can gov't charges	$2,737.00	1 Direction
Seaway tolls	$5,667.00	1 Direction
Pilotage Hamilton		1 Direction
Lines: Hamilton	$650.00	LS
Harbour Dues: Halifax	$85.00	LS
Harbour Dues: Hamilton	$128.00	LS
Insurance est	$2,500.00	LS
Sub-Total: Fixed Costs	**$26,455.00**	Sum of fixed costs

4 **Administration**:

Halifax	$4,500.00	LS Weekly Costs
Hamilton	$3,000.00	LS Weekly Costs
Sub-Total: Administration Costs	**$7,500.00**	Sum of admin costs

5 **Variable Costs**:

Halifax	$35,000.00	1 Direction
Hamilton	$30,625.00	1 Direction
Sub-Total: Variable Costs	**$65,625.00**	Sum of variable costs

6 **Total Costs**:

Ship Costs	$108,991.40	Total from section 2
Fixed Costs	$26,455.00	Total from section 3
Administration	$7,500.00	Total from section 4
Variable Costs	$65,625.00	Total from section 5
TOTAL COSTS	**$208,571.40**	

7 **Revenue**:

53'	$75,000.00	1 Direction
40'	$72,500.00	1 Direction
TOTAL REVENUE	**$147,500.00**	Sum of revenue

8 **Profit/Loss**:

Total Revenue	$147,500.00	From Section 7
Total Costs	$208,571.40	From Section 6
Net Profit/Loss	-$61,071.40	

Weekly Halifax-Hamilton Feeder a)
Pro Forma ($C)

Notes

1 **Assumptions:**

Lifts per week	**700**
Halifax	350
Hamilton	350
20'/40' split	
50%	175
50%	175
Ship cost per day	$15,280
TEU cellular vessel	804
Halifax lift cost	$225.00
Hamilton lift cost	$175.00
IFO Fuel Consumption @ tonnes	15
MDO Fuel Consumption @ tonnes	2.0
Fuel Cost	
IFO 380	$313.00
MDO	$576.00

Halifax Pilotage (per direction)	$600.00
Laurentian & Seaway Pilotage	$14,302.00
Can gov't charges	$2,737.00
Seaway tolls	$8,025.00
Revenue	
Revenue per 53'	$1,000.00
Revenue per 40'	$725.00

2 **Ship Costs:**

Ship = 7 days	$106,960.00	7 Days
Fuel tonnes IFO 180 per day	$23,475.00	5 Days
tonnes MDO per day	$8,064.00	7 Days
Sub-Total: Ship Costs	**$138,499.00**	Sum of ship costs

3 **Fixed Costs**

Pilotage Halifax	$600.00	1 Direction
Pilotage LPA	$14,302.00	1 Direction
Can gov't charges	$2,737.00	1 Direction
Seaway tolls	$8,025.00	1 Direction
Pilotage Hamilton		1 Direction
Lines: Hamilton	$650.00	LS
Harbour Dues: Halifax	$85.00	LS
Harbour Dues: Hamilton	$128.00	LS
Insurance est	$2,500.00	LS
Sub-Total: Fixed Costs	**$29,027.00**	Sum of fixed costs

4 **Administration:**

Halifax	$4,500.00	LS Weekly Costs
Hamilton	$3,000.00	LS Weekly Costs
Sub-Total: Administration Costs	**$7,500.00**	Sum of admin costs

5 **Variable Costs:**

Halifax	$78,750.00	1 Direction
Hamilton	$61,250.00	1 Direction
Sub-Total: Variable Costs	**$140,000.00**	Sum of variable costs

6 **Total Costs:**

Ship Costs	$138,499.00	Total from section 2
Fixed Costs	$29,027.00	Total from section 3
Administration	$7,500.00	Total from section 4
Variable Costs	$140,000.00	Total from section 5
TOTAL COSTS	**$315,026.00**	

7 **Revenue:**

53'	$175,000.00	1 Direction
40'	$126,875.00	1 Direction
TOTAL REVENUE	**$301,875.00**	Sum of revenue

8 **Profit/Loss:**

Total Revenue	$301,875.00	From Section 7
Total Costs	$315,026.00	From Section 6
Net Profit/Loss	-$13,151.00	

Weekly Halifax-Hamilton Feeder a)
Pro Forma ($C)

Notes

1 **Assumptions:**

Lifts per week	**650**
Halifax (200)	325
Hamilton (200)	325
20'/40' split	
53'	325
Ship cost per day	$15,280
TEU cellular vessel	804
Halifax lift cost	$225.00
Hamilton lift cost	$175.00
IFO Fuel Consumption @ tonnes	15
MDO Fuel Consumption @ tonnes	2.0
Fuel Cost	
IFO 380	$313.00
MDO	$576.00

Halifax Pilotage (per direction)	$600.00
Laurentian & Seaway Pilotage	$14,302.00
Can gov't charges	$2,737.00
Seaway tolls	$8,025.00
Revenue	
Revenue per 53'	$1,000.00

2 **Ship Costs:**

Ship x 7 days	$106,960.00	7 Days
Fuel tonnes IFO 180 per day	$23,475.00	5 Days
tonnes MDO per day	$8,064.00	7 Days
Sub-Total: Ship Costs	**$138,499.00**	Sum of ship costs

3 **Fixed Costs:**

Pilotage: Halifax	$600.00	1 Direction
Pilotage LPA	$14,302.00	1 Direction
Can gov't charges	$2,737.00	1 Direction
Seaway tolls	$8,025.00	1 Direction
Pilotage Hamilton		1 Direction
Lines: Hamilton	$650.00	LS
Harbour Dues: Halifax	$85.00	LS
Harbour Dues: Hamilton	$128.00	LS
Insurance est	$2,500.00	LS
Sub-Total: Fixed Costs	**$29,027.00**	Sum of fixed costs

4 **Administration:**

Halifax	$4,500.00	LS Weekly Costs
Hamilton	$3,000.00	LS Weekly Costs
Sub-Total: Administration Costs	**$7,500.00**	Sum of admin costs

5 **Variable Costs:**

Halifax	$73,125.00	1 Direction
Hamilton	$56,875.00	1 Direction
Sub-Total: Variable Costs	**$130,000.00**	Sum of variable costs

6 **Total Costs:**

Ship Costs	$138,499.00	Total from section 2
Fixed Costs	$29,027.00	Total from section 3
Administration	$7,500.00	Total from section 4
Variable Costs	$130,000.00	Total from section 5
TOTAL COSTS	**$305,026.00**	

7 **Revenue:**

53'	$325,000.00	1 Direction
40'	$0.00	1 Direction
TOTAL REVENUE	**$325,000.00**	Sum of revenue

8 **Profit/Loss:**

Total Revenue	$325,000.00	From Section 7
Total Costs	$305,026.00	From Section 6
Net Profit/Loss	$19,974.00	

Weekly Halifax-Hamilton Feeder a)
Pro Forma ($C)

Notes

1 **Assumptions:**

Lifts per week	
Halifax	325
Sept Iles	100
Hamilton	325
split	
Halifax-Hamilton	275
Sept Iles-Hamilton	50
Sept Iles-Halifax	50
Ship cost per day	$15,280
TEU cellular vessel	804
Halifax lift cost	$225.00
Sept Iles lift	$175.00
Hamilton lift cost	$175.00
IFO Fuel Consumption @ tonnes	15
MDO Fuel Consumption @ tonnes	2.0
Fuel Cost	
IFO 380	$313.00
MDO	$576.00

Halifax Pilotage	$600.00
Sept Iles pilotage	$1,500.00
Laurentian & Seaway Pilotage	$14,302.00
Can gov't charges	$2,737.00
Seaway tolls	$8,025.00
Revenue	
Halifax-Hamilton	$1,000.00
Sept Iles-Hamilton	$1,000.00
Sept Iles-Halifax	$740.00

2 **Ship Costs:**

Ship x 7 days	$106,960.00	7 Days
Fuel tonnes IFO 180 per day	$28,170.00	6 Days
tonnes MDO per day	$8,064.00	7 Days
Sub-Total: Ship Costs	**$143,194.00**	Sum of ship costs

3 **Fixed Costs:**

Pilotage: Halifax	$600.00	1 Direction
Pilotage LPA	$14,302.00	1 Direction
Can gov't charges	$2,737.00	1 Direction
Seaway tolls	$8,025.00	1 Direction
Pilotage Sept Iles	$1,000.00	2 Direction
Lines: Hamilton	$650.00	LS
Harbour Dues: Halifax	$85.00	LS
Harbour Dues: Hamilton	$128.00	LS
Insurance est.	$2,500.00	LS
Sub-Total: Fixed Costs	**$30,027.00**	Sum of fixed costs

4 **Administration:**

Halifax	$4,500.00	LS	Weekly Costs
Sept Iles	$2,500.00		
Hamilton	$3,000.00	LS	Weekly Costs
Sub-Total: Administration Costs	**$10,000.00**	Sum of admin costs	

5 **Variable Costs:**

Halifax	$73,125.00	1 Direction
Sept Iles	$17,500.00	1 Direction
Hamilton	$56,875.00	
Sub-Total: Variable Costs	**$147,500.00**	Sum of variable costs

6 **Total Costs:**

Ship Costs	$143,194.00	Total from section 2
Fixed Costs	$30,027.00	Total from section 3
Administration	$10,000.00	Total from section 4
Variable Costs	$147,500.00	Total from section 5
TOTAL COSTS	**$330,721.00**	

7 **Revenue:**

Halifax-Hamilton	$275,000.00	1 Direction
Sept Iles-Hamilton	$50,000.00	
Sept Iles-Halifax	$37,000.00	1 Direction
TOTAL REVENUE	**$362,000.00**	Sum of revenue

8 **Profit/Loss:**

Total Revenue	$362,000.00	From Section 7
Total Costs	$330,721.00	From Section 6
Net Profit/Loss	$31,279.00	